SEVENTH FRAMEWORK
PROGRAMME

Collaborative Large-scale Integrating Project

OPENCOSS

Open Platform for EvolutioNary Certification Of Safety-critical Systems

OPENCOSS Platform - Final Prototype User Manual

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Document History

Version	Date	Remarks
V0.5	2013-07-19	Initial Version
V0.6	2013-08-07	Added: Mapping between RefFrameworks & Process Management (Idoya and Huáscar)
V0.61	2013-09-02	Edition of Assurance Project and Baseline improved, as well as a new section for Compliance Map edition
V 0.7	2013-10-21	Changes to the version 0.6 of the First Prototype
V 0.8	2014-06-01	Update to describe the second prototype functionalities (Server and Client parts)
V 0.9	2014-09-10	Update to add the mapping management
V 1.0	2014-12-11	Described functionality added on client and server in 3rd prototype

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1 Executive Summary

This document is a user manual of the OPENCOSS platform tools prototype implementation. In this document the user can find the installing instructions, the tool environment description, and the functionalities starting from the creation of Reference Frameworks (models representing Standards, Regulations, or Company-specific Processes), creation of Assurance Projects and the associated Baseline (subset of Reference Framework to be applied in a specific assurance project), Evidences model (Artefacts), Process model (Activities) Compliance Maps (so far, compliance maps from Reference Artefacts to Artefacts), Argumentation model and web interface reports.

Finally, functionality facilitated by OPENCOSS web UI server has been described.

This document has been elaborated as a Fast User Manual. Further questions must be directed to the TECNALIA team.

2 OPENCOSS platform - basic concepts

2.1 Client-Server architecture

OPENCOSS platform tools are designed to follow client-server architecture approach.

OPENCOSS platform deployment model consists of:

- **OPENCOSS server** - installed in a central host machine
  Note:
  *Functionality facilitated by OPENCOSS server has been described in "**OPENCOSS server**" chapter.*

- One or many **OPENCOSS clients** - each of which installed on specific user machines
  Note:
  *Functionality facilitated by OPENCOSS clients has been described in several chapters: from "**Prescriptive Knowledge Management**" to "**Mapping Management**".*

2.2 Naming conventions in OPENCOSS client

In this document, the naming convention follows the following concepts:

- **Environment** supports (a large part of) the software tool process. OPENCOSS tool platform is the main environment in this document.
- **Workbenches** support only one or a few activities. Example: "*Evidence Management*" workbench.
- **Tool** support only specific tasks in the software tool process. Example: "Evidence Analysis".

The OPENCOSS tool platform has the following Workbenches:

Workbench	Description
Prescriptive Knowledge Management	Functionality related to the management (edition, search, transfer, etc.) of standards information as well as any other information derived from them, such as interpretations about intents, mapping between standards, etc. This functional group maintain a knowledge database about "reference frameworks" (model of standards, regulations, etc.), which can be used by other OPENCOSS functionalities.
Assurance Project Lifecycle Management	This functionality factorizes aspects such as the creation of safety assurance projects locally in OPENCOSS and any project baseline information that may be shared by the different functional modules. A project baseline is a subset of reference framework (e.g., subset of a standard) that will be applied to a given assurance project.
Safety Argumentation Management	This group manages argumentation information in a modular fashion. It also includes mechanisms to support compositional safety assurance, and assurance patterns management.
Evidence Management	This module manages the full life-cycle of evidences and evidence chains. This includes evidence traceability management and impact analysis. In addition, this module is in charge of communicating with external engineering tools

	(requirements management, implementation, V&V, etc.)
Process Assurance Management	This functionality group handles every activity related to the specification, execution and validation of safety assurance processes in connection with engineering processes, It also manages compliance information related to functional safety standards. This module should be integrated with process-related tools managed by companies (ALM/PLMs, process workflows, etc.)

Table 1 - Workbenches OPENCOSS tool platform

3 Installation of OPENCOSS server and clients

As it has already been introduced, OPENCOSS platform tools are designed in client-server architecture approach.

The following chapters present how to install server on a central machine and clients on user machines respectively.

3.1 Installation of OPENCOSS platform server

OPENCOSS platform server should be installed on a corporate central server host, which is accessible from company user machines.
The OPENCOSS server infrastructure consists of the following main components:

- PostgreSQL database - which stores OPENCOSS data
- Apache Tomcat web server - which provides OPENCOSS server services
- OPENCOSS web applications deployed on the web server

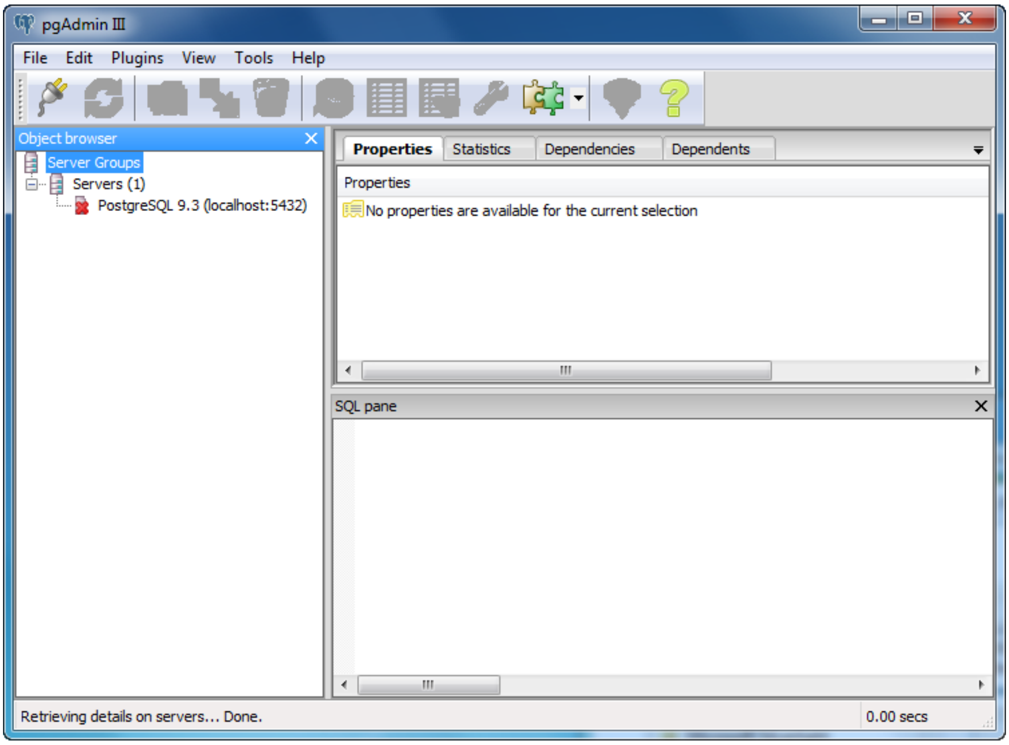
Follow the steps below in order to install the OPENCOSS server infrastructure on a central host.

3.1.1 Installation of PostgreSQL database

OPENCOSS platform tools use PostgreSQL database.
Download it from PostgreSQL official website http://www.postgresql.org/download/.
Follow the PostgreSQL installation instructions to install and setup it.
For user convenience, PostgreSQL installation on Windows has been described in the chapter below.

3.1.1.1 Installation of PostgreSQL database on Windows machine

1. Download PostgreSQL installer
    a. Go to the download section for Windows http://www.postgresql.org/download/windows/
    b. Click on download installer from EnterpriseDB
    c. Choose the latest version and download it
2. Double click the installer file and follow the installation wizard.
3. Most important steps during the installation process are (among others):
    a. Definition of a password for the database super-user (his login is “postgres”).
    b. Definition of a port for PostgreSQL - the default 5432 is recommended.
    c. If the installation wizard asks you to launch Stack Builder to install additional tools, you may skip this step - no additional tools are needed.
    d. The installation may take a few minutes to complete.
4. Verify the database installation
    a. The quick way to verify the installation is to use pgAdmin application which has been installed together with PostgreSQL server.
    Please run “pgAdmin III”. The following GUI is displayed:


pgAdmin III
File Edit Plugins View Tools Help
Object browser
Server Groups
Servers (1)
PostgreSQL 9.3 (localhost:5432)
Properties Statistics Dependencies Dependents
Properties
SQL pane
0.00 secs

No properties are available for the current selection

Retrieving details on servers... Done.

Figure 1 - pgAdmin application

b. In the left panel, double click on **PostgreSQL 9.3** tree node. The application will ask to enter a database super-user password. Please enter the password which has been defined during PostgreSQL server installation.

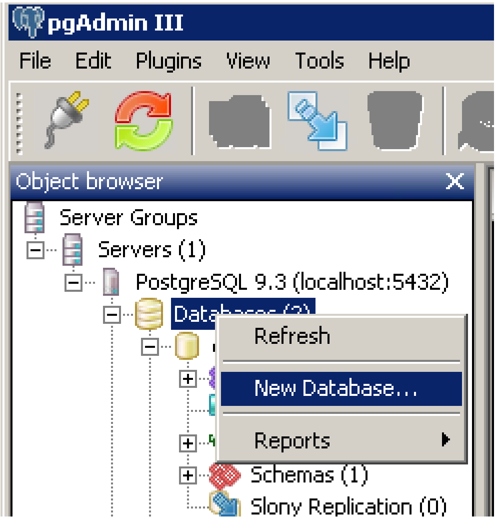
c. When database objects are displayed, your database server has been installed correctly.

d. You can now define login role with non-super-user rights. This account will be used to login to the database later on, as it is not advisable to work on a daily basis with super-privileged user account. In this example we use role “opencossdbms” with password “opencossdbms”. You can use pgAdmin to do so, or bring up the PostgreSQL textual console (psql) and type:

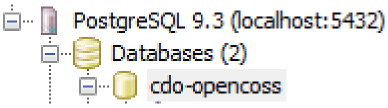
```
> create role opencossdbms with login createdb encrypted password
'opencossdbms';
```

3.1.2 Creating OPENCOSS database in PostreSQL

This step demonstrates how to create a database in PostreSQL which will store data tables used by OPENCOSS platform tools.
In “pgAdmin III” application right-click **Databases** tree node and choose “New Database...” option.



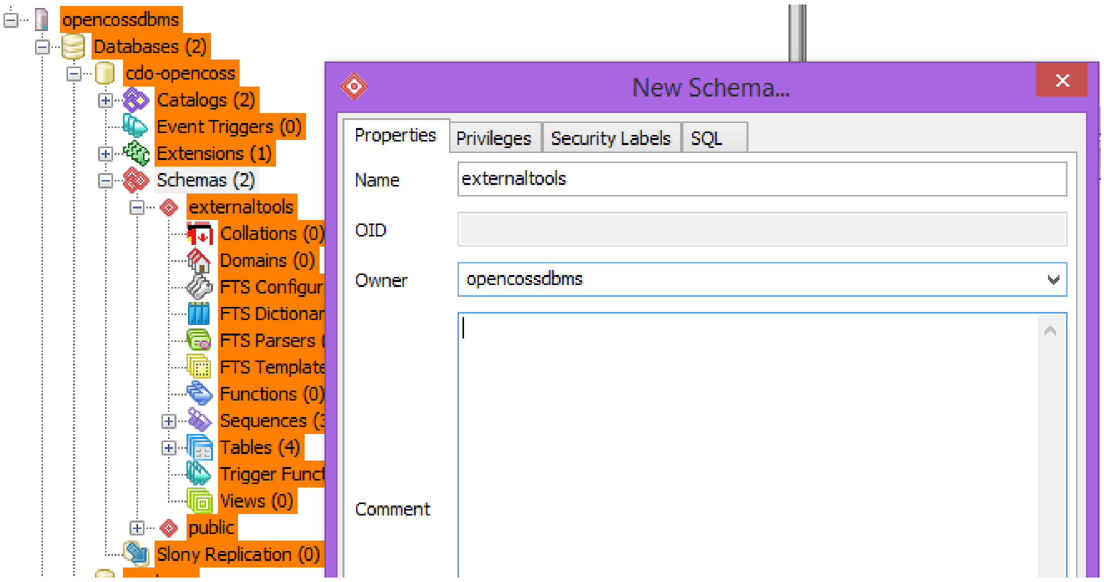
In the dialog which opens, please provide the database name as “cdo-opencoss” and set “opencossdbms” as its owner. The database will be created.



Alternatively, when “pgAdmin III” application is not available, database can be created using “psql” command line.
In order to do it, please run “psql” application and issue the following command:
> CREATE DATABASE “cdo-opencoss” with owner “opencossdbms”;

Note:
“cdo-opencoss” is a default database name which is accessed by OPENCOSS server. This can be reconfigured later in OPENCOSS server configuration file (*<entry key="dbName">*). For details about the server configuration file, see Installation of OPENCOSS server distribution.

In “pgAdmin III” application right-click **Schemas** (for cdo-opencoss db) tree node and choose “New schema...” option.



Name: externaltools

Owner: opencossdbms

Create schema name: **externaltools** with owner **opencossdbms.** The schema will be created.

Alternatively, when “pgAdmin III” application is not available, schema can be created using “psql” command line. In order to do it, please run “psql” application and issue the following command:
> CREATE SCHEMA *externaltools* AUTHORIZATION *opencossdbms;*

Then in pgAdmin application (or psql command line) execute query:
ALTER DATABASE "cdo-opencoss" set search_path=externaltools,public

3.1.3 Installation of OPENCOSS server distribution

1. Download and unpack OPENCOSS Server distribution.
   The latest build can be downloaded from:

   http://77.252.162.49:8080/opencoss/server/OpencossServer.zip

   The downloaded OPENCOSS server distribution consists of Apache Tomcat web server with deployed OPENCOSS server web applications.

   Please unzip it to some target installation folder. The folder will be referred to as [OPENCOSS_DIR] in this document.

   Note for developers:
   The distribution contains *!!!README.OPENCOSS!!!* file which describes what files are added to the default Apache Tomcat application.

2. OPENCOSS server requires Java JRE version 8. If it is not present on the machine, please install it. It can be downloaded from:

http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html

3. Configure Tomcat to use Java JRE 8 installed on your computer.
   In order to do this, please navigate to [OPENCOSS_DIR]/bin folder,
   and edit catalina.bat file (on Windows) or catalina.sh (on Linux).
   Scroll down in the code until you pass the end of the beginning "rem" comments, and adjust the following code pointing to your Java JRE root directory:

   - for example on Windows:
     set JRE_HOME=C:\Program Files\Java\jre8
   - for example on Linux:
     export JRE_HOME=/usr/java/jdk1.8

   Save your changes.

4. Adjust OPENCOSS server configuration file settings.

   Go to [OPENCOSS_DIR]/conf-opencoss folder and move opencoss-properties.xml file from this location to the operating system user home directory. This is the location from where OPENCOSS server reads opencoss-properties.xml settings file.
   The location, depending on the operating system, would be:
   - Windows XP: *c:\Documents and Settings\<username>\opencoss-properties.xml*
   - Windows 7/8: *c:\Users\<username>\opencoss-properties.xml*
   - Linux: */home/<username>/opencoss-properties.xml*

   Edit *opencoss-properties.xml* settings file.
   The most important entries in this file are:
   - *"dbUser" / "dbPassword"*
     These are PostgreSQL user credentials. Please specify a valid user and password for your PostgreSQL server.
   - *"serverAddress"*
     This is CDO repository name which is broadcasted by the CDO server. The "localhost" value should be replaced with the specific server machine host name in order OPENCOSS tool clients are able to connect to this server repository from other hosts. Please modify the following entry:
     *<entry key="serverAddress">**localhost**:2036</entry>*
     by replacing "localhost" with the specific server host name, e.g.:
     *<entry key="serverAddress">**host-name.acme.com**:2036</entry>*

5. Start OPENCOSS server by going to [OPENCOSS_DIR]/bin folder and running startup.bat (Windows) or startup.sh (Linux).

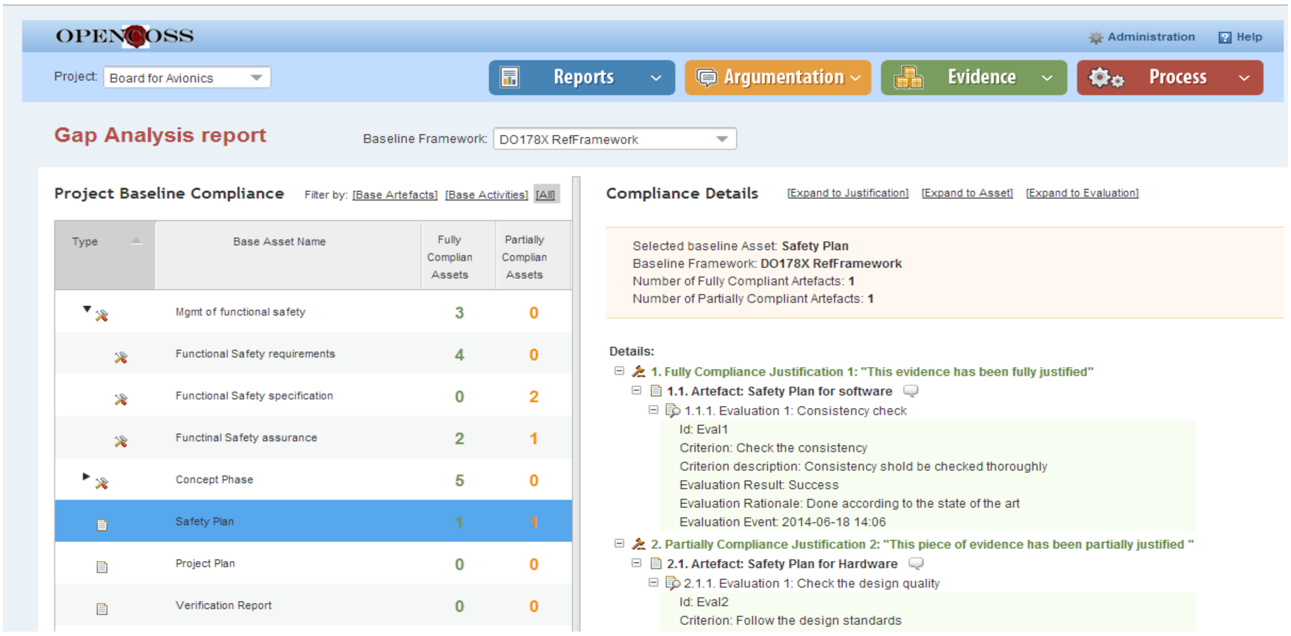
6. Verify OPENCOSS platform web application

OPENCOSS server web pages are served at 8080 port.
Please run your web browser and go to the following location:
http://<OPENCOSS-SERVER-HOST-NAME>:8080/

in particular when you are on the server machine:

http://localhost:8080/

The OPENCOSS platform server page should be displayed, presenting one of web reports.



Project Baseline Compliance   Filter by: [Base Artefacts] [Base Activities] [All]

Type	Base Asset Name	Fully Complian Assets	Partially Complian Assets
▼	Mgmt of functional safety	3	0
	Functional Safety requirements	4	0
	Functional Safety specification	0	2
	Functinal Safety assurance	2	1
▶	Concept Phase	5	0
	Safety Plan	1	1
	Project Plan	0	0
	Verification Report	0	0

Compliance Details   [Expand to Justification] [Expand to Asset] [Expand to Evaluation]

Selected baseline Asset: **Safety Plan**
Baseline Framework: **DO178X RefFramework**
Number of Fully Compliant Artefacts: **1**
Number of Partially Compliant Artefacts: **1**

Details:

- 1. Fully Compliance Justification 1: "This evidence has been fully justified"
  - **1.1. Artefact: Safety Plan for software**
    - 1.1.1. Evaluation 1: Consistency check
      Id: Eval1
      Criterion: Check the consistency
      Criterion description: Consistency shold be checked thoroughly
      Evaluation Result: Success
      Evaluation Rationale: Done according to the state of the art
      Evaluation Event: 2014-06-18 14:06
- 2. Partially Compliance Justification 2: "This piece of evidence has been partially justified "
  - **2.1. Artefact: Safety Plan for Hardware**
    - 2.1.1. Evaluation 1: Check the design quality
      Id: Eval2
      Criterion: Follow the design standards

Figure 2 - OPENCOSS platform main page

Now some data should be entered to OPENCOSS server using OPENCOSS client tools, in order it can be visualized by web reports.

NOTE:
At this stage of installation process, OPENCOSS database tables have not been created yet.
In order to use OPENCOSS web reports, all database tables need to be created.
To do this, please install the OPENCOSS Eclipse client, as described in the subsequent chapter, connect to the CDO server and create some new Assurance Project.

3.2 Installation of OPENCOSS platform client

3.2.1 Client bundle download

It is required to have installed (minimum) **Java Environment 1.6**.

To install the OPENCOSS platform client download it using one of the links below according to your OS Platform and uncompress it into your hard disk.

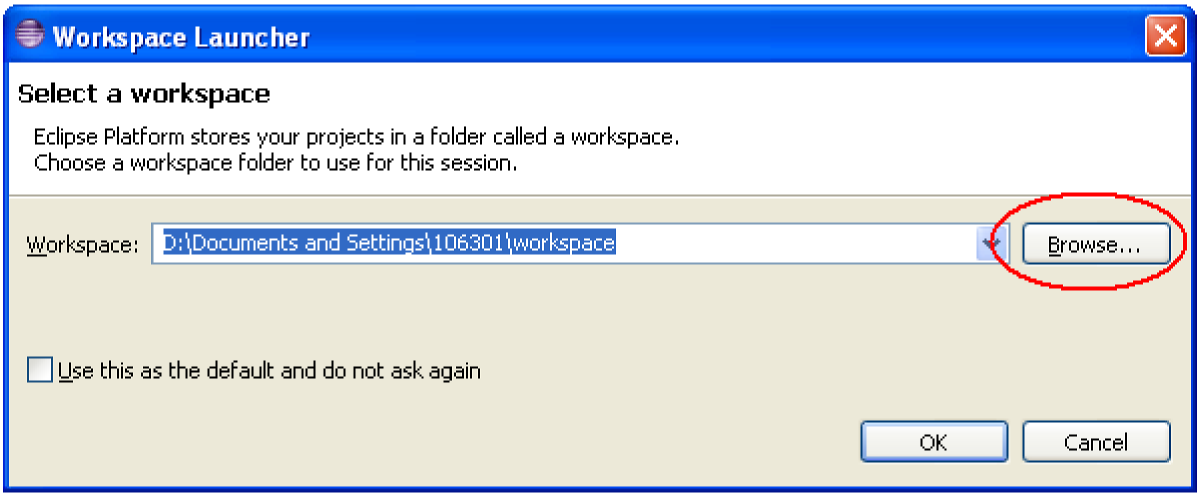
http://77.252.162.49:8080/opencoss/client/20141219_OpencossClient_Win_64.zip

http://77.252.162.49:8080/opencoss/client/20141219_OpencossClient_Win_32.zip

http://77.252.162.49:8080/opencoss/client/20141219_OpencossClient_Linux_64.tar.gz

3.2.2 Client configuration

To use the platform execute the eclipse.exe file and introduce a select a folder that will be used as workspace.



Workspace Launcher

Select a workspace

Eclipse Platform stores your projects in a folder called a workspace.
Choose a workspace folder to use for this session.

Workspace: D:\Documents and Settings\106301\workspace

□ Use this as the default and do not ask again

Figure 3 - Select the workspace menu

The first step after the installation process is to configure the connection settings with the CDO repository where all the models generated using the platform will be stored. This information must be introduced in the Model Repository Preference page inside the Opencoss category. Go to menu Window → Preferences to open this window.

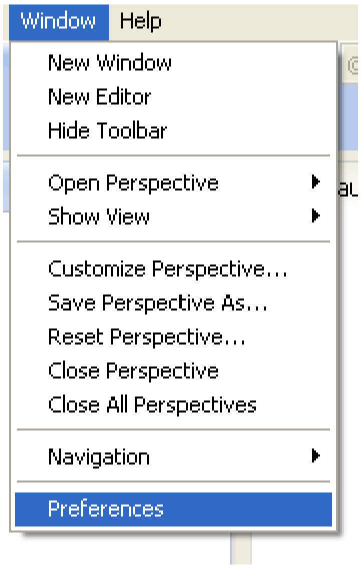
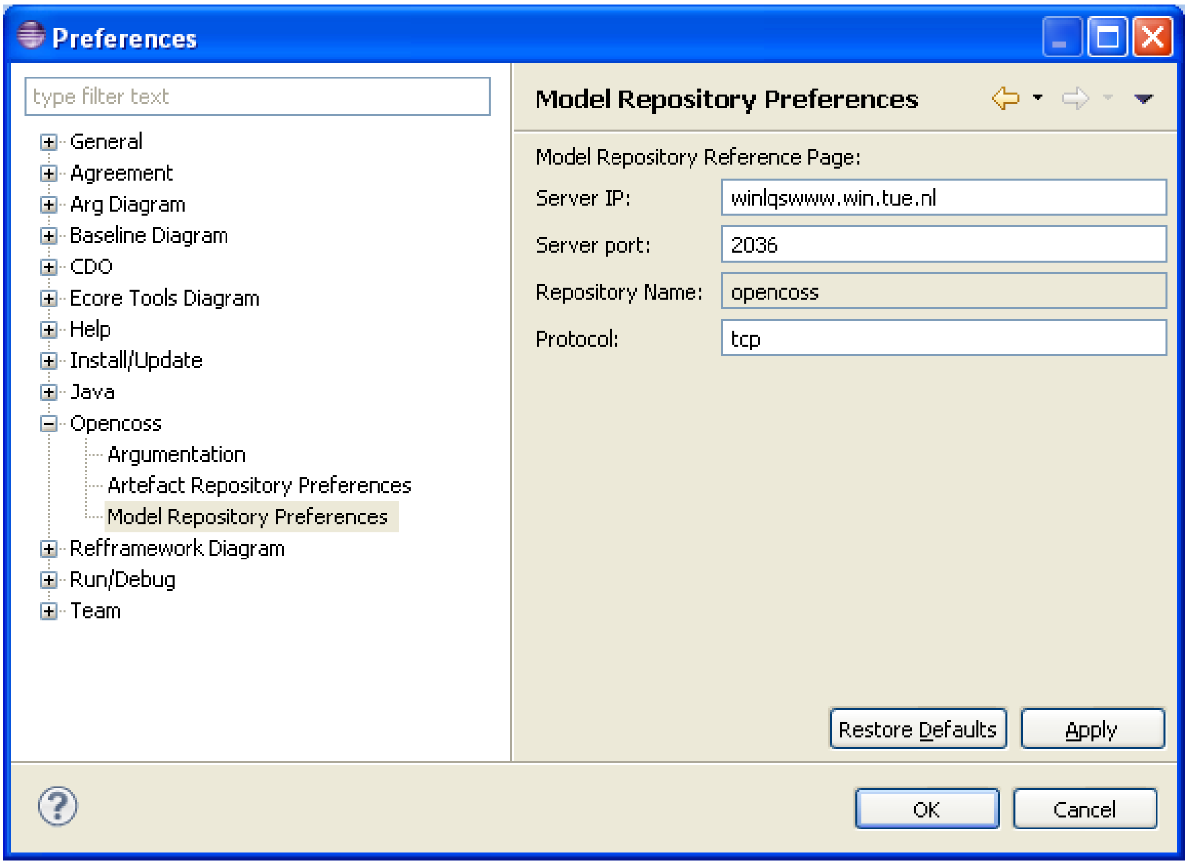


Figure 4 - Preference menu



Model Repository Reference Page:

Server IP: winlqswww.win.tue.nl

Server port: 2036

Repository Name: opencoss

Protocol: tcp

Figure 5 - Model Repository Configuration Page linked to the TUE repository

The information to introduce is:

- **Server IP**: The IP of the running CDO Server.
- **Server Port**: The port used by the running CDO Server.
- **Repository name**: The name of the repository where all the date will be stored (read only).
- **Protocol:** The protocol used to connect to the CDO Server.

After introducing this data the Repository Explorer View can be used inside the Opencoss category. The objective of this view is showing the contents of the repository configured. To open it go to menu Window→ Show View→ Other.

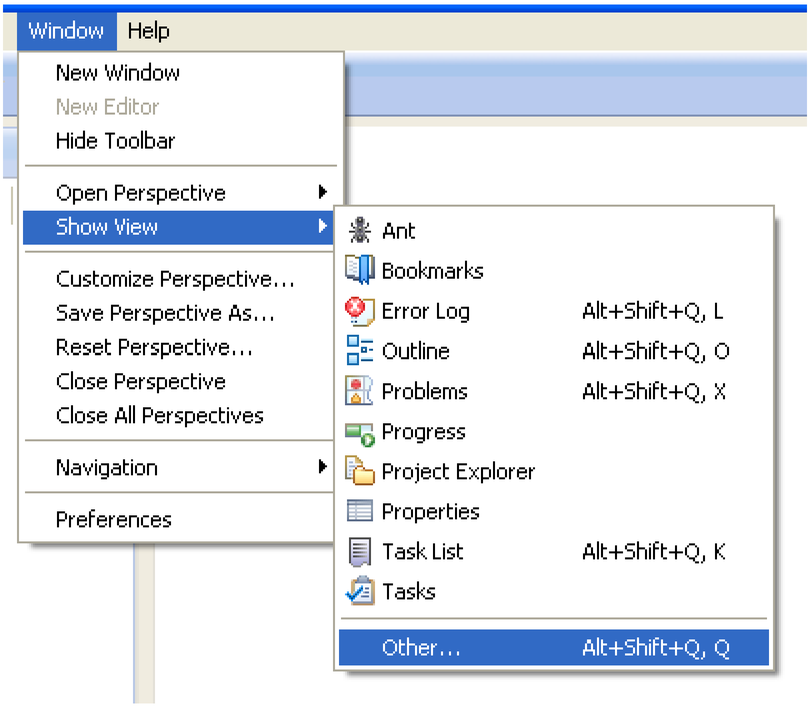


Figure 6 - Show view menu

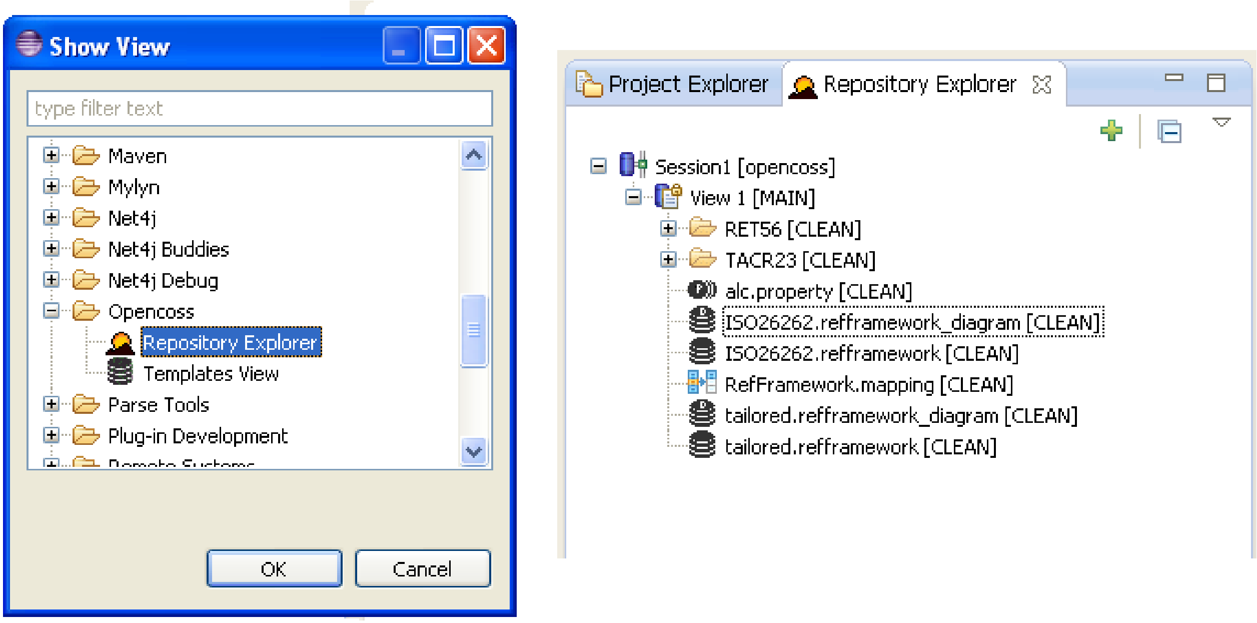
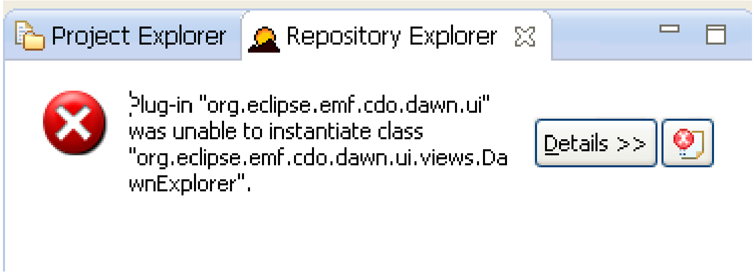


Figure 7 - Repository Explorer View

If the provided connection settings with the repository are incorrect or the server is not running, this view will display the error in the screenshot below instead of the contents of the repository. To solve it, check the server is running and the configuration settings are correct, close the view and open it again.



Plug-in "org.eclipse.emf.cdo.dawn.ui" was unable to instantiate class "org.eclipse.emf.cdo.dawn.ui.views.DawnExplorer".

Figure 8 - Repository Explorer content with configuration error

After that, if the server is not installed in the same machine, copy opencoss-properties.xml from server to your local drive. The destination path, depending on the operating system, should be:

- Windows XP: c:\Documents and Settings\<username>\opencoss-properties.xml
- Windows 7/8: c:\Users\<username>\opencoss-properties.xml
- Linux: /home/<username>/opencoss-properties.xml

3.2.3 Deleting Repository contents

To delete a folder and its contents, right click over it and left click the “DELETE Folder” menu.

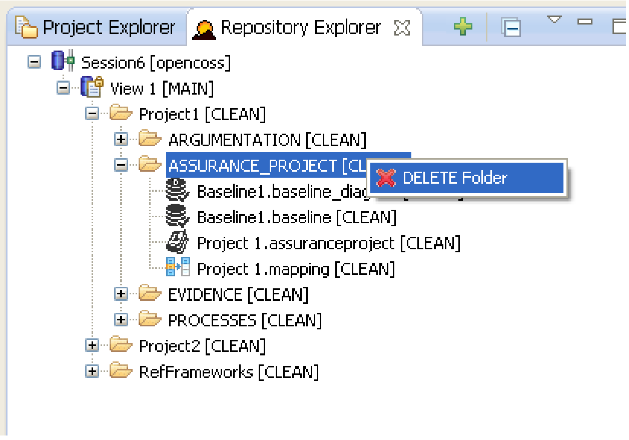


Figure 9 – Delete folder menu

To delete a model, right click over it and left click the “DELETE Model “menu.

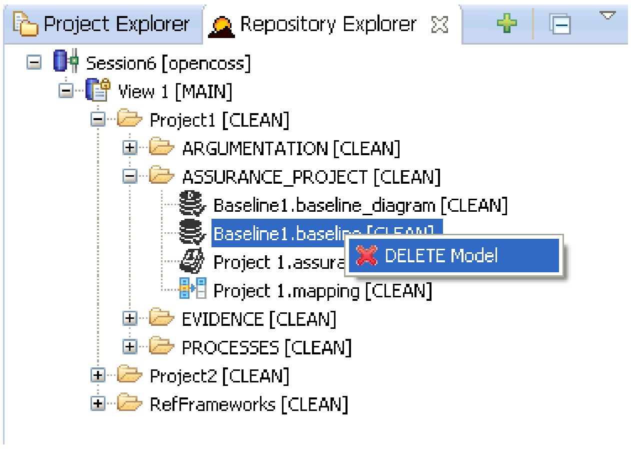


Figure 10 - Delete model menu

4 Prescriptive Knowledge Management

The current version of the OPENCOSS prototype only covers Edition of the Reference Framework models. It does not cover CCL Vocabulary specification.

Users can use the Reference Framework Editor to model Standards (IEC 61508, ISO 26262, DO-178C, EN 50126, and the like), any Regulations (either as additional Requirements or model elements in a given model representing a Standard or a new Reference Framework), and Company-specific processes (e.g., the Alstom, Thales or Fiat process to develop safety-critical systems).

Each Reference Framework model can be also mapped to other Reference Framework models by using the concept of Equivalence Map.

Finally, Reference Frameworks can be used to create Assurance Project Baselines. Baseline Models represent the subset of the Reference Frameworks tailored for individual Assurance Projects. For more details on Baselines, please see the Assurance Project management Section.

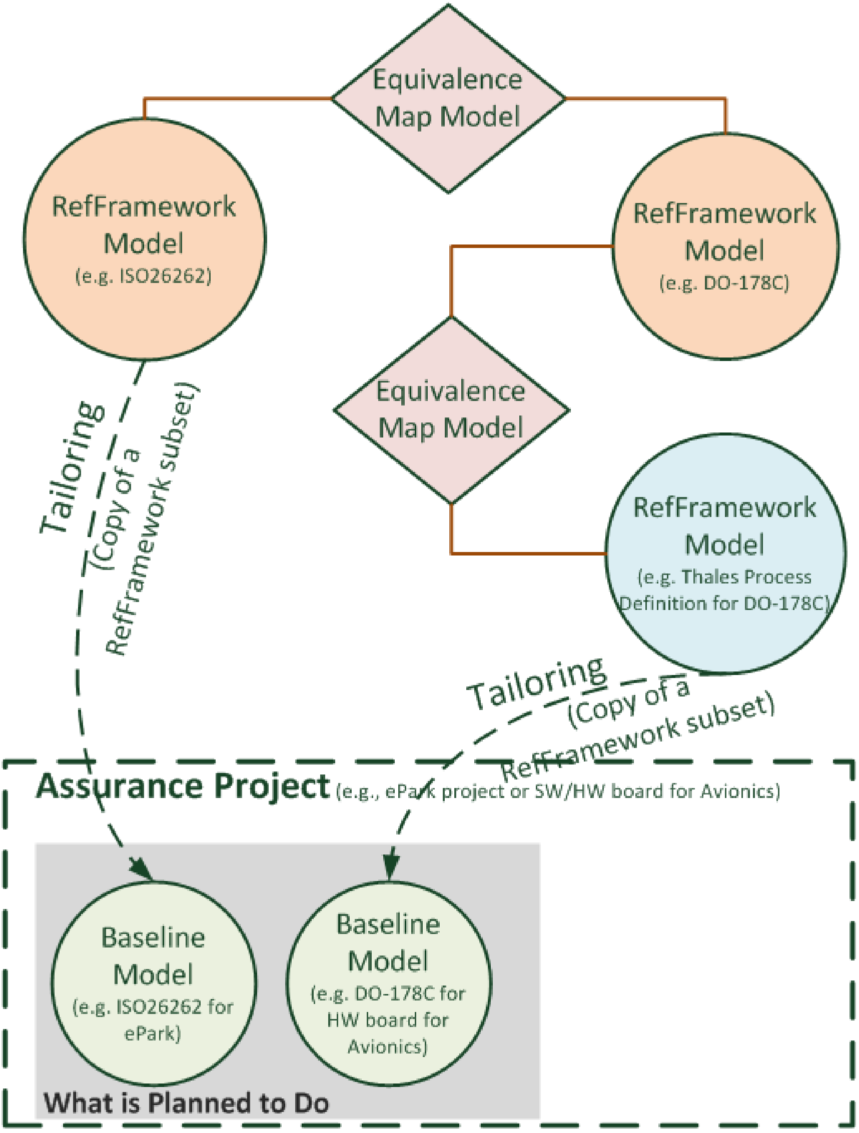

Equivalence Map Model
RefFramework Model (e.g. ISO26262)
RefFramework Model (e.g. DO-178C)
Equivalence Map Model
RefFramework Model (e.g. Thales Process Definition for DO-178C)
Tailoring (Copy of a RefFramework subset)
Tailoring (Copy of a RefFramework subset)
Assurance Project (e.g., ePark project or SW/HW board for Avionics)
Baseline Model (e.g. ISO26262 for ePark)
Baseline Model (e.g. DO-178C for HW board for Avionics)
What is Planned to Do

Figure 11 - Reference Framework concepts

4.1 Create Reference Framework model

In order to create a new Reference Framework model, follow the next steps:

- From the File menu, choose New -> Other …

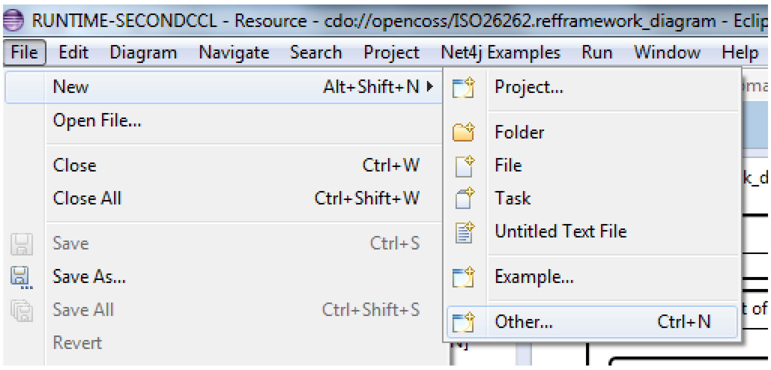
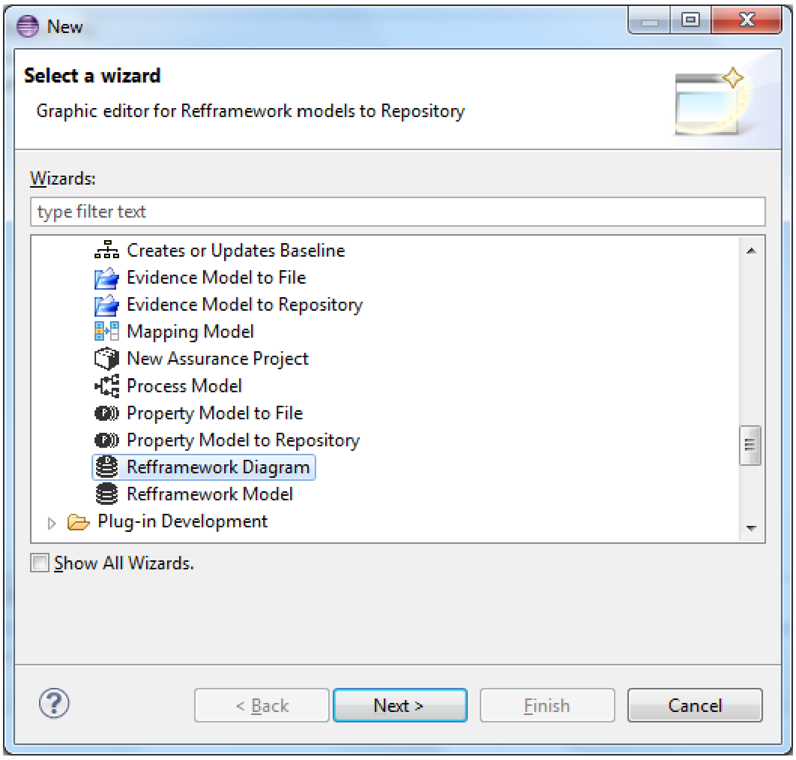


Figure 12 - New Reference Framework model

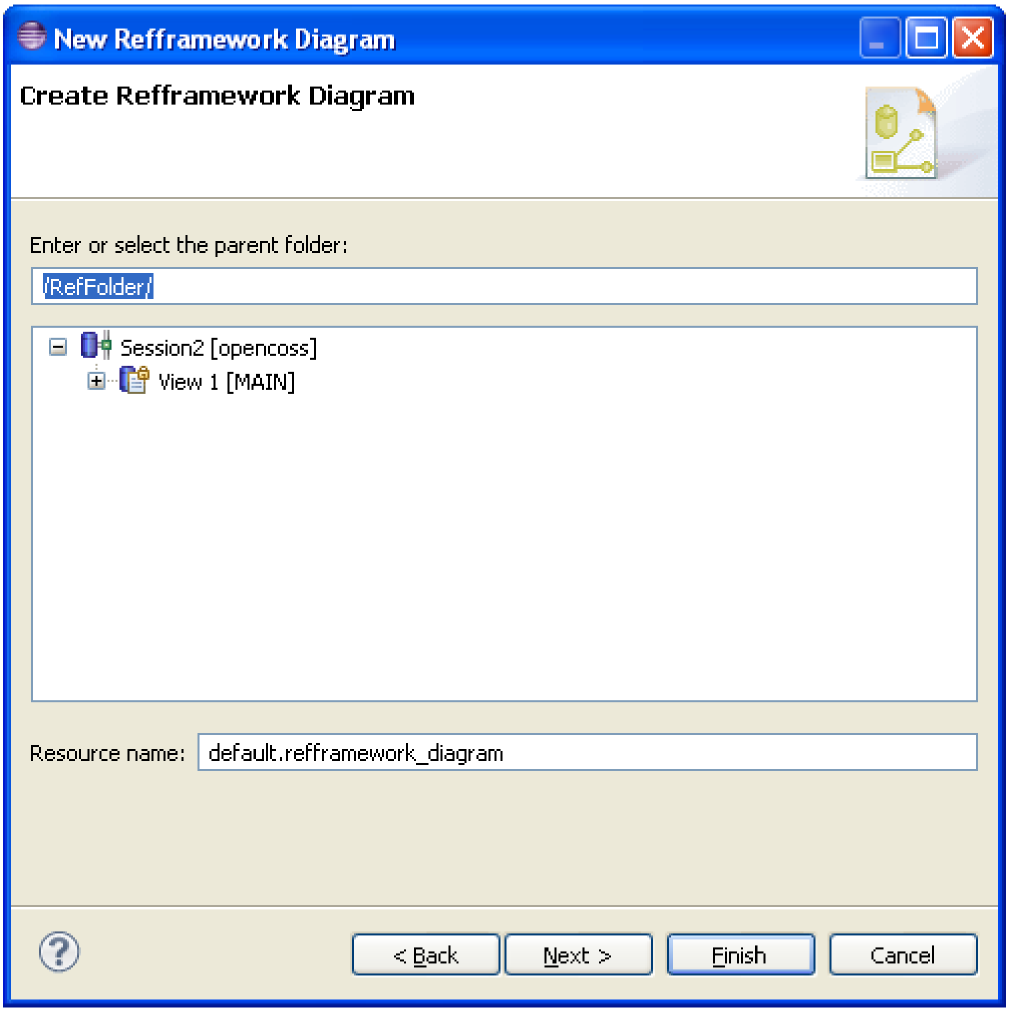
- In the Wizard dialog, open the Opencoss category, and the select Refframework Diagram, and press the Next button.



Graphic editor for Refframework models to Repository

Figure 13 - Wizard Reference Framework model

- In the New Refframework Diagram dialog, select or enter the parent folder, the name of the diagram to be created, and press the Next button.



Create Refframework Diagram

Enter or select the parent folder: /RefFolder/

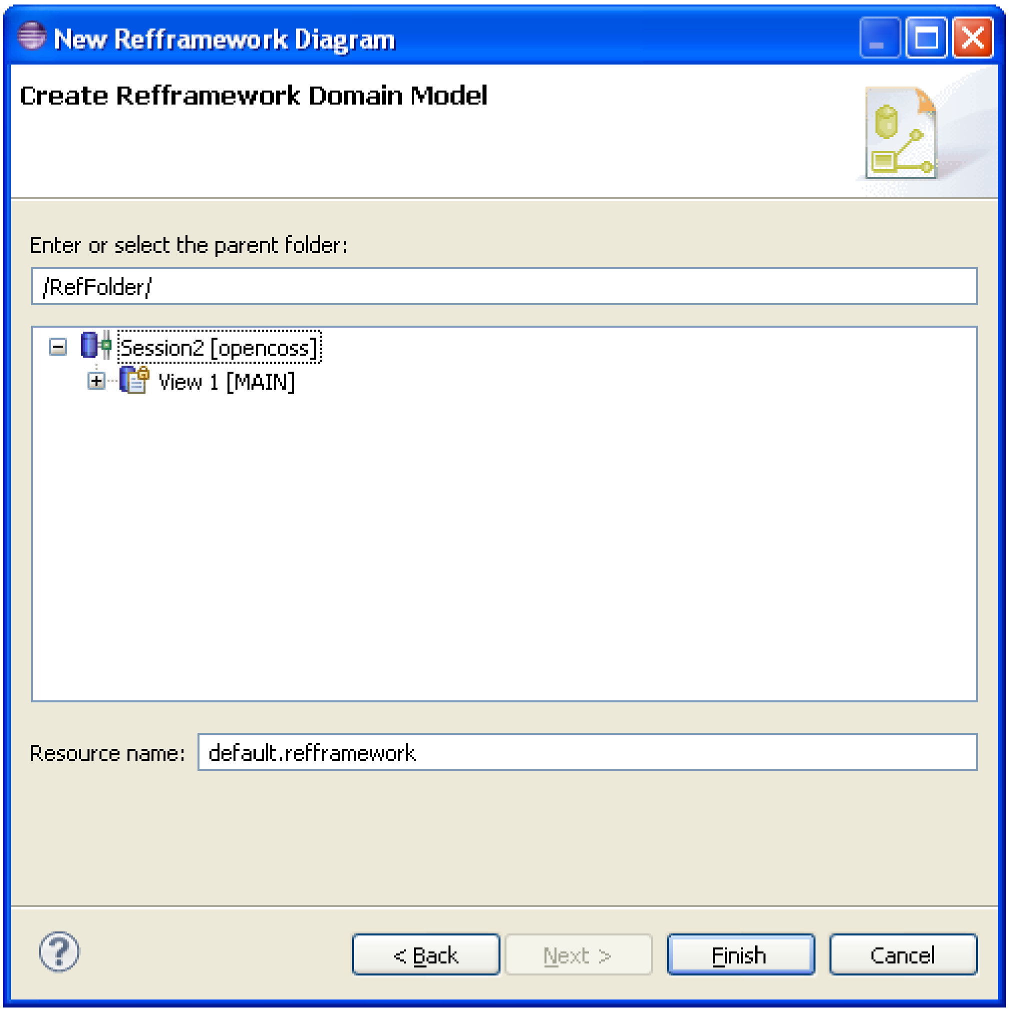
Session2 [opencoss]

View 1 [MAIN]

Resource name: default.refframework_diagram

Figure 14 - New Refframework Diagram

- In the New Refframework Domain model page, select or enter the same name as in the previous step as parent folder, enter the name of the diagram to be created, and press the Finish button.



New Refframework Diagram

Create Refframework Domain Model

Enter or select the parent folder:

/RefFolder/

Session2 [opencoss]
View 1 [MAIN]

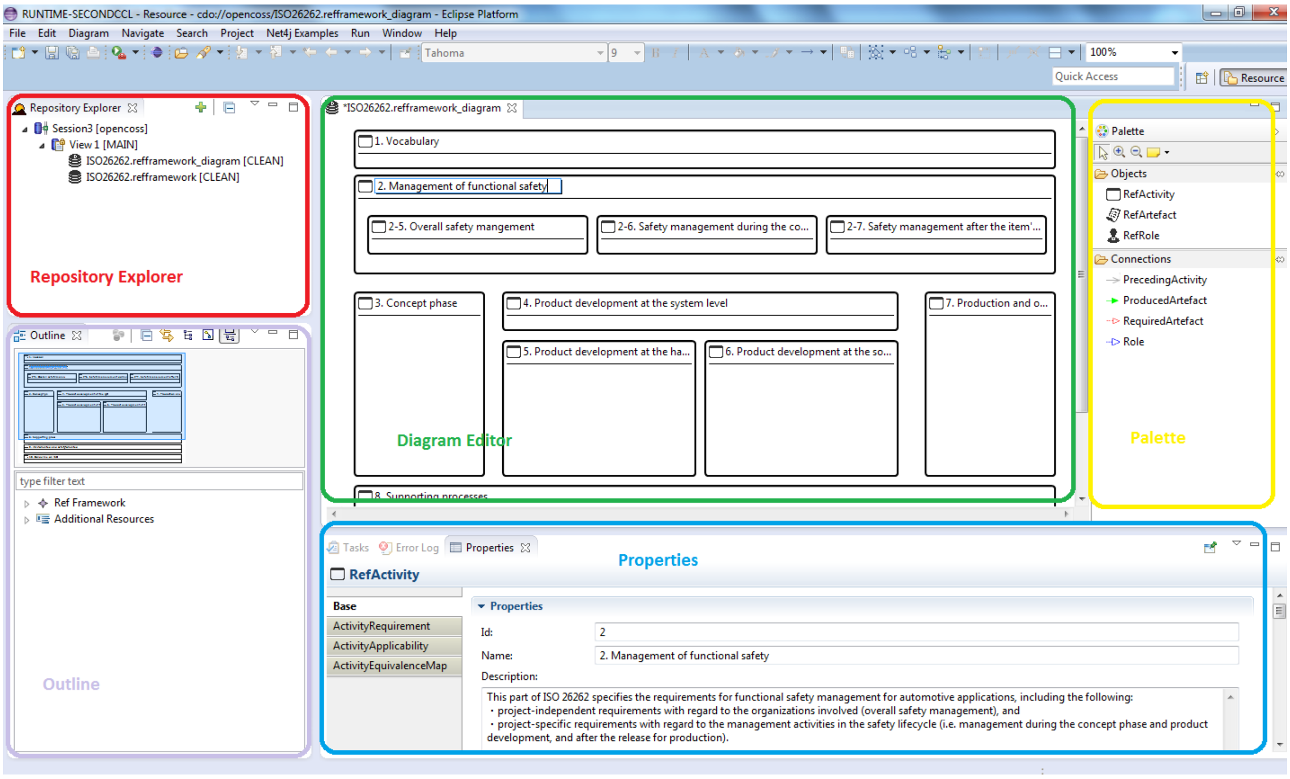
Resource name: default.refframework

Figure 15 - New Refframework Domain Model

4.2 How to edit a Reference Framework model

After complete the Refframework Diagram creation wizard, the perspective of the tool will be opened composed by five views:

1. The **Repository Explorer** shows the contents of the repository.
2. The **Outline** shows the elements of the model and permits its edition.
3. The **Diagram Editor** permits the graphical modelling of a subset of concepts of the Reference Framework.
4. The **Palette** is a toolbox with the concepts of the model and the connections between them to add to the diagram.
5. The **Properties** to edit the properties of the element of the model selected.


RUNTIME-SECONDCCL - Resource - cdo://opencoss/ISO26262.refframework_diagram - Eclipse Platform
File Edit Diagram Navigate Search Project Net4j Examples Run Window Help
Tahoma
9
100%
Quick Access
Resource
Repository Explorer
Session3 [opencoss]
View 1 [MAIN]
ISO26262.refframework_diagram [CLEAN]
ISO26262.refframework [CLEAN]
Repository Explorer
Outline
type filter text
Ref Framework
Additional Resources
Outline
*ISO26262.refframework_diagram
1. Vocabulary
2. Management of functional safety
2-5. Overall safety mangement
2-6. Safety management during the co...
2-7. Safety management after the item'...
3. Concept phase
4. Product development at the system level
5. Product development at the ha...
6. Product development at the so...
7. Production and o...
8. Supporting processes
Diagram Editor
Palette
Objects
RefActivity
RefArtefact
RefRole
Connections
PrecedingActivity
ProducedArtefact
RequiredArtefact
Role
Palette
Tasks
Error Log
Properties
Properties
RefActivity
Base
ActivityRequirement
ActivityApplicability
ActivityEquivalenceMap
Properties

Id: 2

Name: 2. Management of functional safety

Description:

This part of ISO 26262 specifies the requirements for functional safety management for automotive applications, including the following:
- project-independent requirements with regard to the organizations involved (overall safety management), and
- project-specific requirements with regard to the management activities in the safety lifecycle (i.e. management during the concept phase and product development, and after the release for production).

Figure 16 - Refframework editor perspective

4.2.1 Add concepts to the diagram

To add concepts to the diagram, left click in a category Object of the palette and move the cursor over the diagram zone. This cursor appears if it is possible to add this object in the target diagram location according to the modelling rules (Reference Framework metamodel), if not this other ⃠ will appear.
A figure representing the concept will be displayed in the diagram.

4.2.2 Add links between concepts

To add link between concepts, select it from the Connections category of the palette. This cursor ↖ appears if this object can be the origin of the connection, according to the modelling rules (Reference

Framework metamodel), if not this other will appear. Maintain the left mouse clicked, the cursor will become , and move to the destination object, the same icons will appear if the destination is correct or not.

4.2.3 Edit properties

Some model elements from Reference Framework cannot be edited graphically (RefRequirements, RefApplicability tables, among others). These model elements can be edited by using the Properties view.

If the properties view is not visible, you can open it by using the contextual menu of the figures “Show Properties View” of the figures.

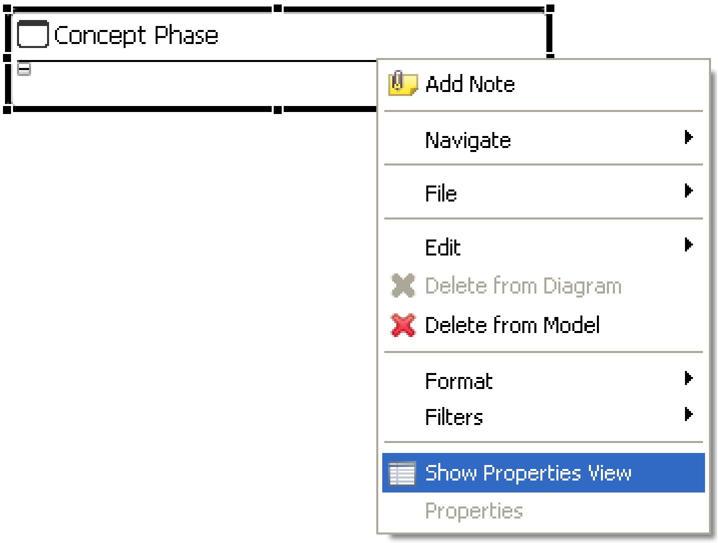


Figure 17 - Show properties view

4.2.4 Create multi-diagrams from a Reference Framework model

The tool allows managing different views of a model through a set of diagrams. Once a model is available, a new diagram view can be created and special edition functionalities are available as follows:

1. Thanks to the Outline view, it is possible to drag and drop concepts from the model to the diagram.
2. Once a concept has been selected, it can be hidden through the “Delete from diagram” option available in the contextual menu. This option does not delete the concept from the model.
3. Once a concept has been selected, it can be deleted through the “Delete from model” option available in the contextual menu. This option delete the concept from the model permanently. If this deleted concept is visible in another diagram files, this concepts will be shown with a cross icon in the upper right corner to show that it does not exist anymore.

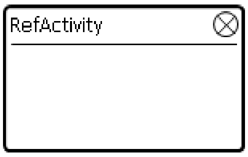
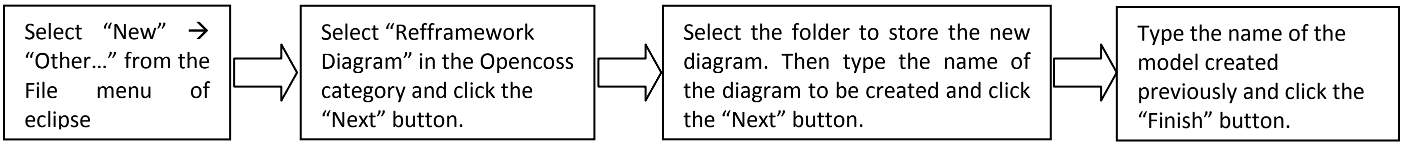


Figure 18 - Deleted concept shown in a diagram

Once a model is available, a new diagram view can be created following the procedure below.

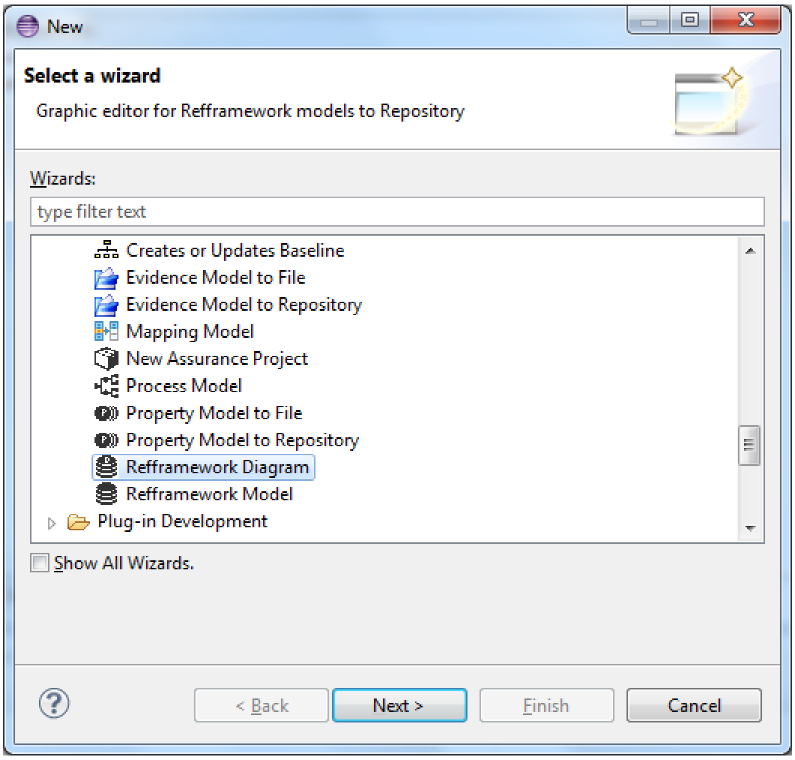


Select "New" → "Other…" from the File menu of eclipse

Select "Refframework Diagram" in the Opencoss category and click the "Next" button.

Select the folder to store the new diagram. Then type the name of the diagram to be created and click the "Next" button.

Type the name of the model created previously and click the "Finish" button.



New

Select a wizard

Graphic editor for Refframework models to Repository

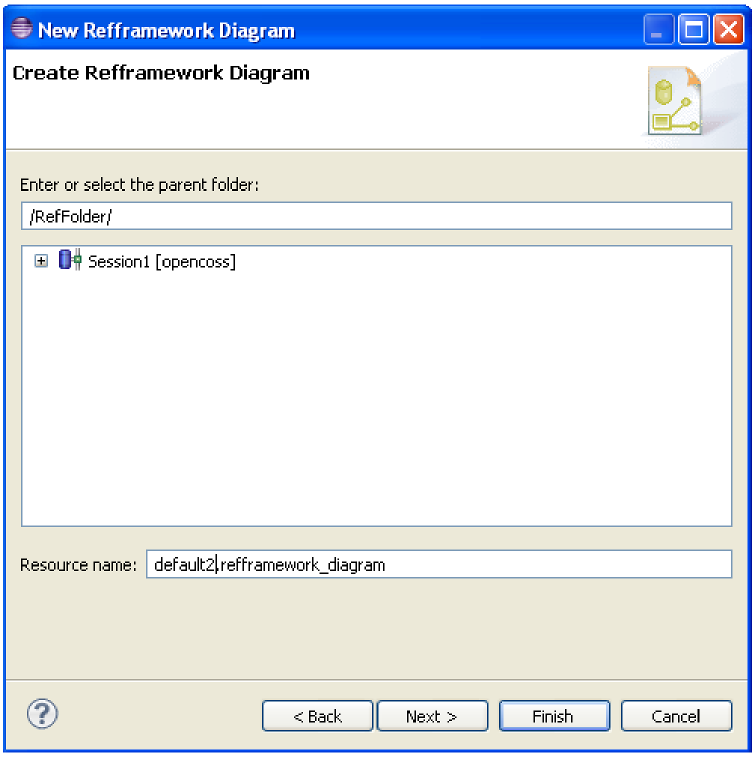
Wizards:

type filter text

- Creates or Updates Baseline
- Evidence Model to File
- Evidence Model to Repository
- Mapping Model
- New Assurance Project
- Process Model
- Property Model to File
- Property Model to Repository
- Refframework Diagram
- Refframework Model
- Plug-in Development

☐ Show All Wizards.

Figure 19 - Refframework Diagram wizard I



New Refframework Diagram

Create Refframework Diagram

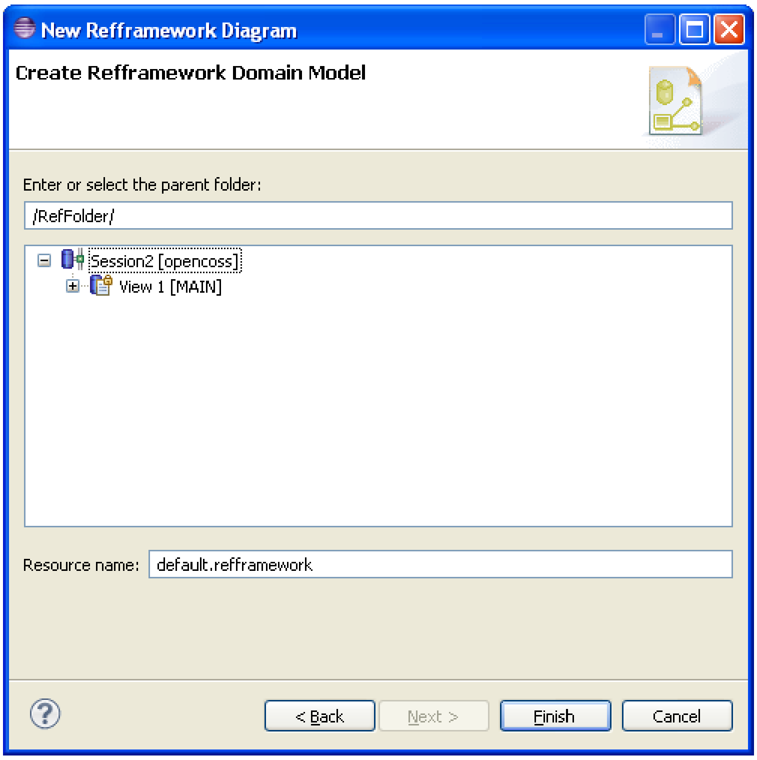
Enter or select the parent folder:

/RefFolder/

⊞ Session1 [opencoss]

Resource name: default2.refframework_diagram

Figure 20 - Refframework Diagram wizard II



New Refframework Diagram

Create Refframework Domain Model

Enter or select the parent folder:

/RefFolder/

Session2 [opencoss]

View 1 [MAIN]

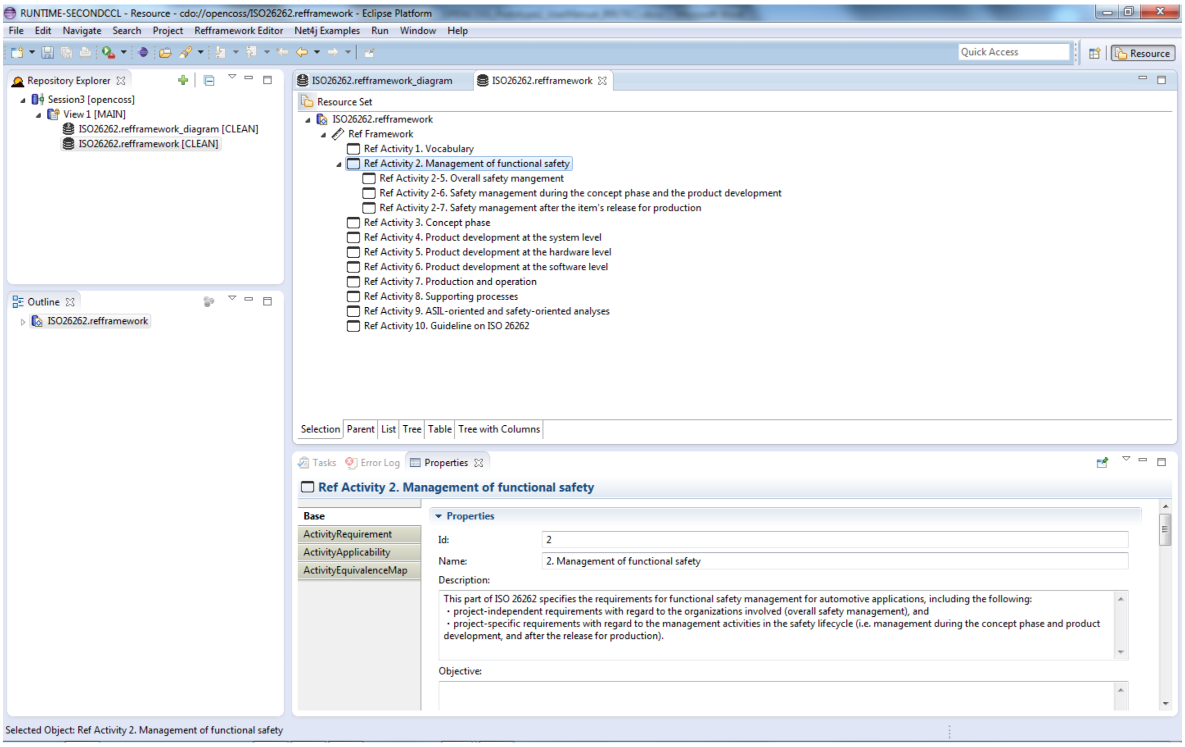
Resource name: default.refframework

Figure 21 - Refframework Diagram wizard III

After that, the diagram is ready for edition.

4.2.5 Non graphical editor

Alternatively to the graphical Editor, the Reference Framework model can be edited by using a purely Form Editor. To do so, open the file created together with the Diagram file (extension: **xxx.refframework**).



RUNTIME-SECONDCCL - Resource - cdo://opencoss/ISO26262.refframework - Eclipse Platform

Session3 [opencoss]
View 1 [MAIN]
ISO26262.refframework_diagram [CLEAN]
ISO26262.refframework [CLEAN]

ISO26262.refframework

Resource Set
ISO26262.refframework
Ref Framework
Ref Activity 1. Vocabulary
Ref Activity 2. Management of functional safety
Ref Activity 2-5. Overall safety mangement
Ref Activity 2-6. Safety management during the concept phase and the product development
Ref Activity 2-7. Safety management after the item's release for production
Ref Activity 3. Concept phase
Ref Activity 4. Product development at the system level
Ref Activity 5. Product development at the hardware level
Ref Activity 6. Product development at the software level
Ref Activity 7. Production and operation
Ref Activity 8. Supporting processes
Ref Activity 9. ASIL-oriented and safety-oriented analyses
Ref Activity 10. Guideline on ISO 26262

Ref Activity 2. Management of functional safety

Base
ActivityRequirement
ActivityApplicability
ActivityEquivalenceMap

Properties

Id: 2

Name: 2. Management of functional safety

Description:

This part of ISO 26262 specifies the requirements for functional safety management for automotive applications, including the following:
• project-independent requirements with regard to the organizations involved (overall safety management), and
• project-specific requirements with regard to the management activities in the safety lifecycle (i.e. management during the concept phase and product development, and after the release for production).

Objective:

Selected Object: Ref Activity 2. Management of functional safety

Figure 22 - Model tree editor

It is also possible to use the Outline view to create new model elements, as shown below.

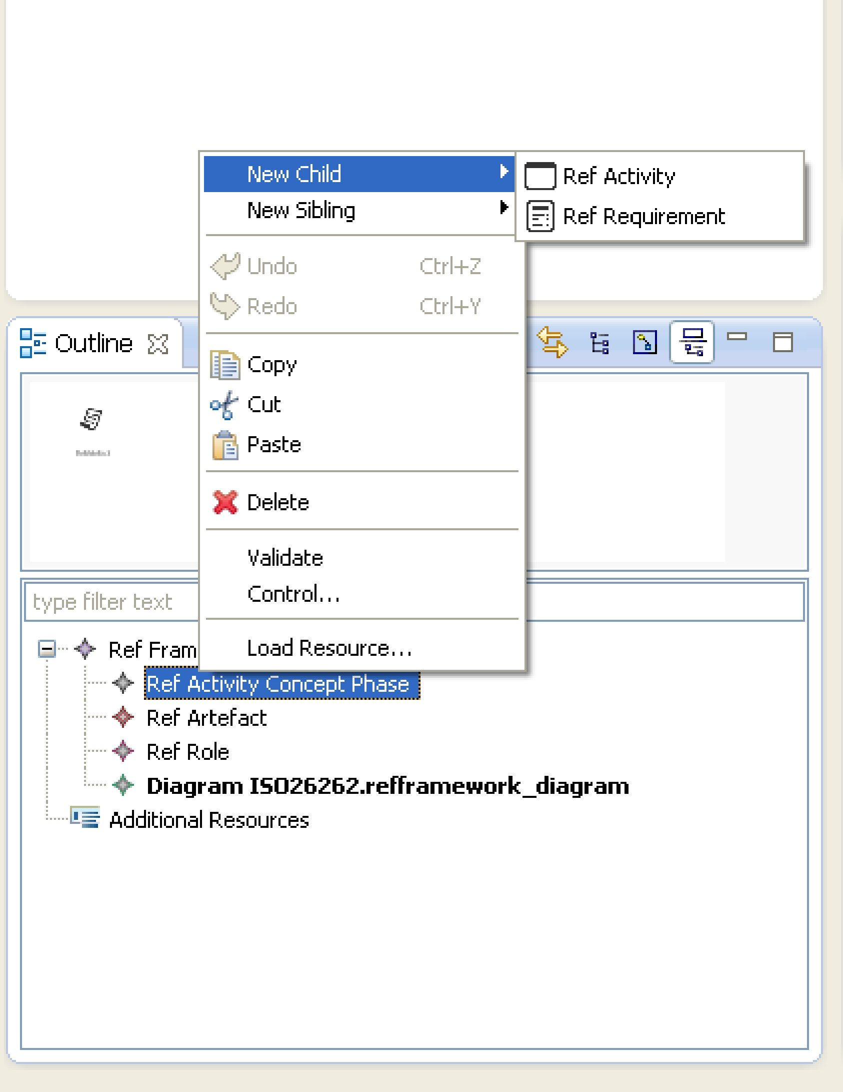


Figure 23 - Edit model from Outline

4.3 Creating Equivalence Maps

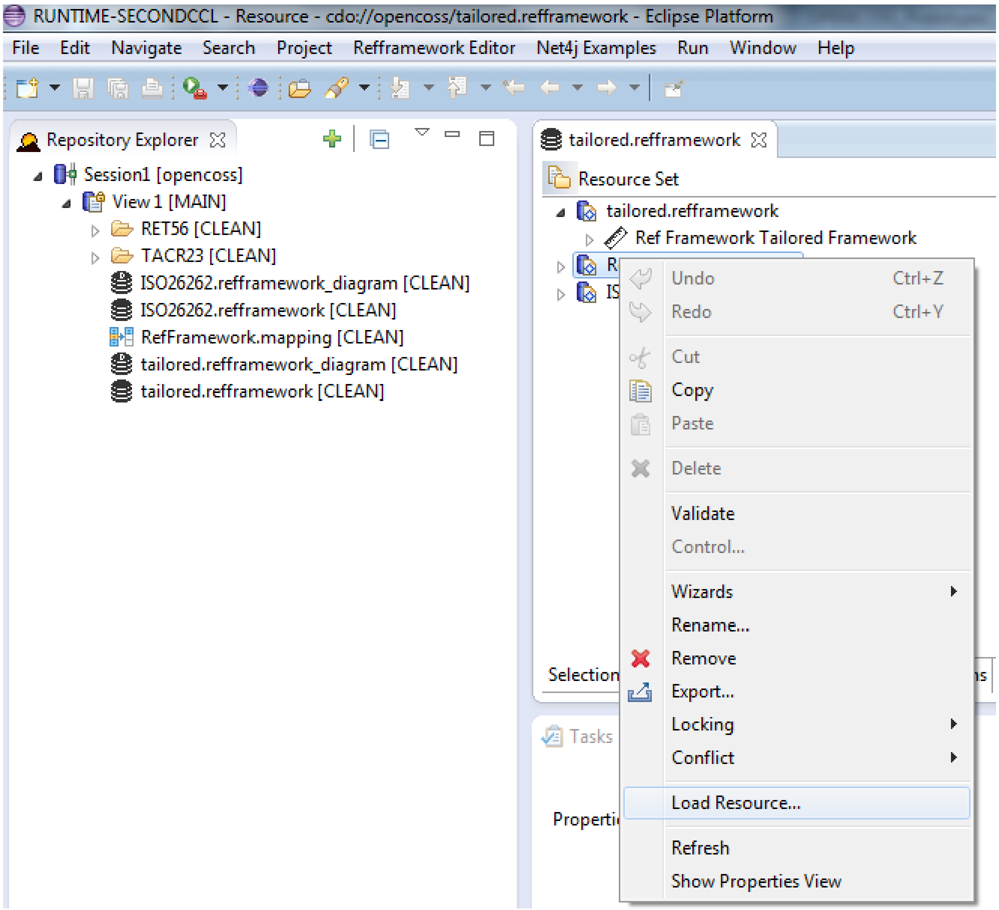
It's possible to create Equivalence Maps in two ways:

- One way, using the editor,
- Another way, using a tailored functionality for it.

4.3.1 Equivalence Map using the editor.

To create Equivalence Maps using the editor, it's necessary to load two CDO resources: the reference framework model (.refframework) and the mapping model (.mapping).

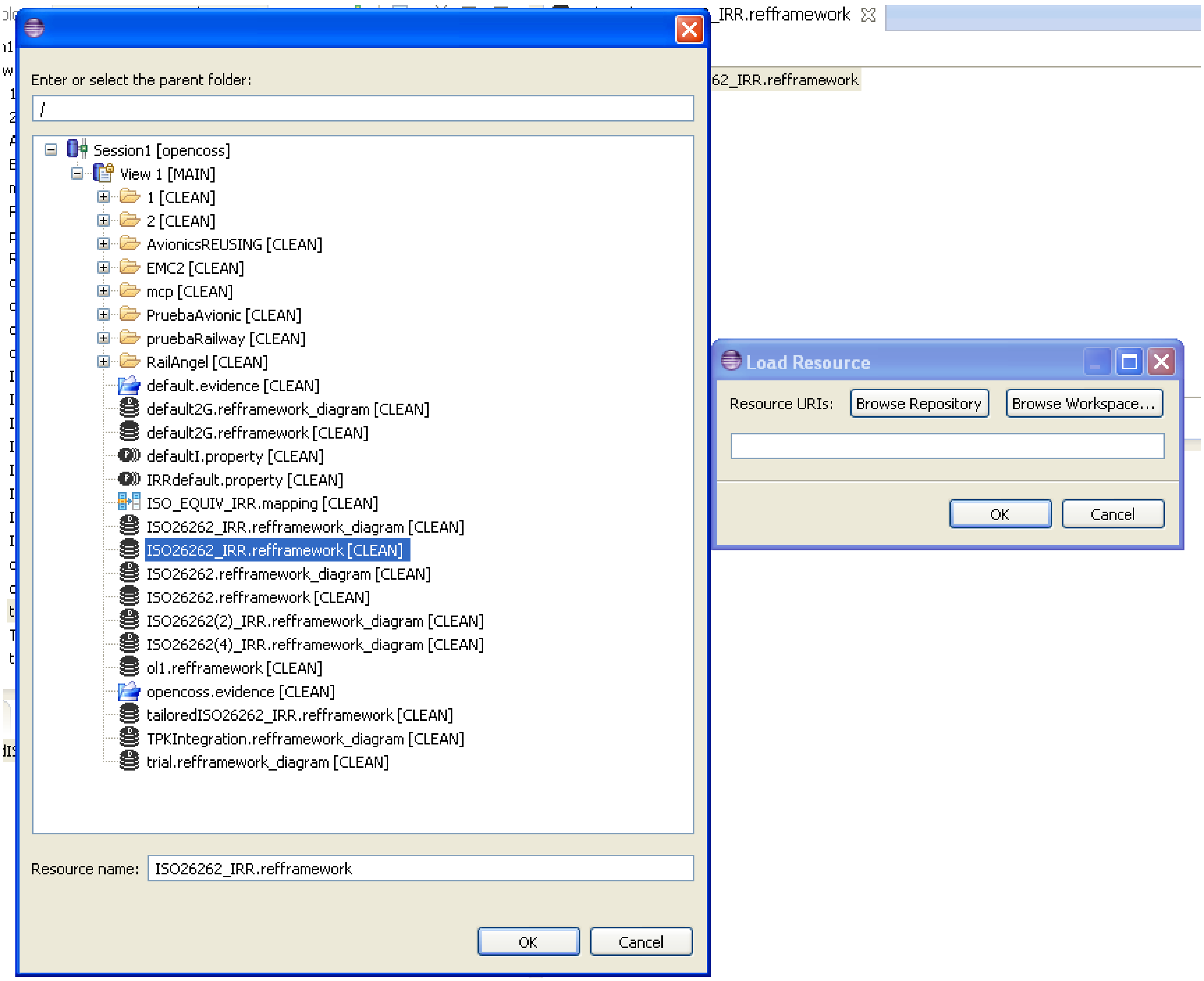
So, press the editing window and select "Load Resource" in the context menu.



RUNTIME-SECONDCCL - Resource - cdo://opencoss/tailored.refframework - Eclipse Platform

Figure 24 - Load Resource I

Then select the refframework model and mapping model using the “Browse Repository” button to obtain the URI of any model stored in the repository.



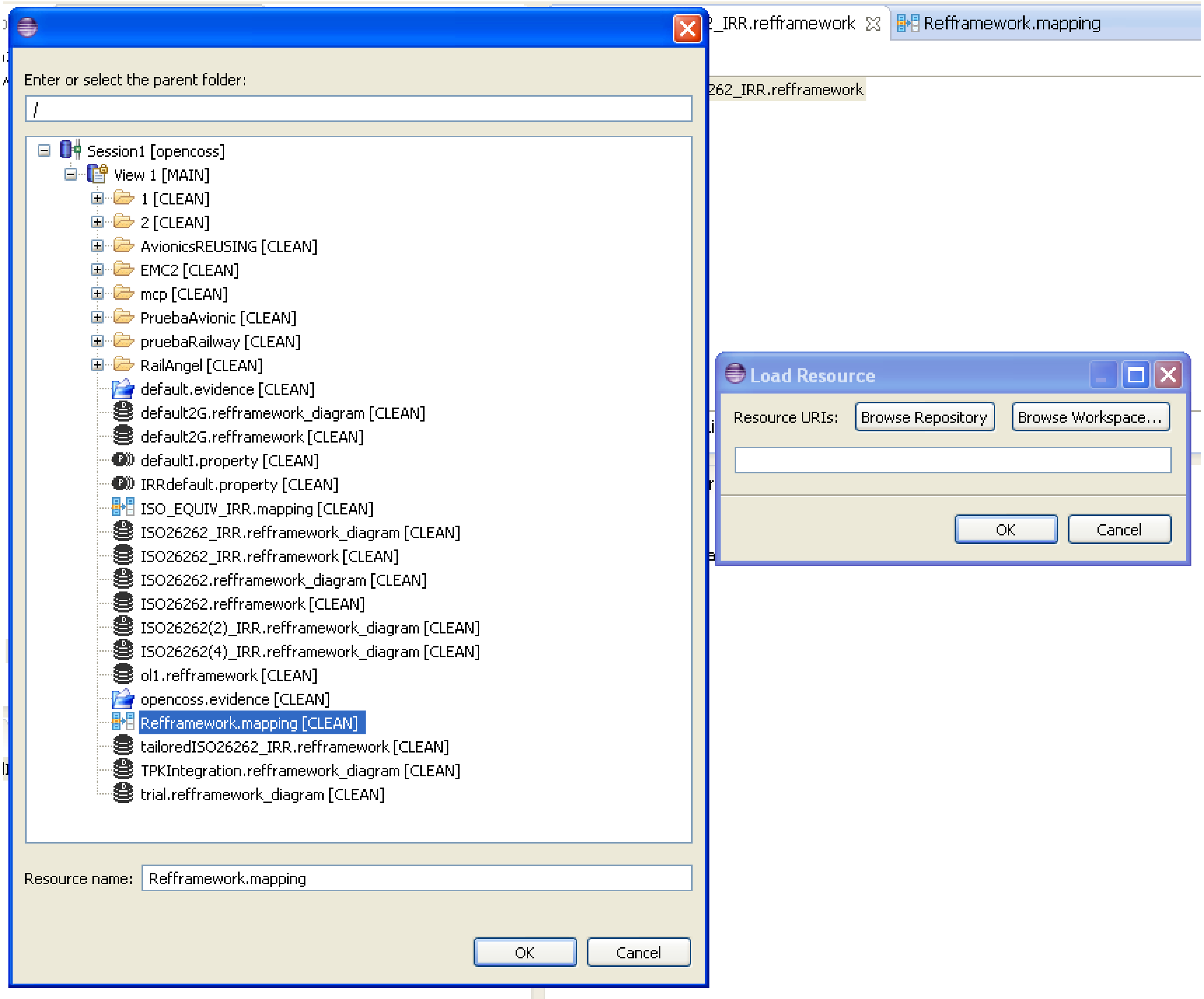
Enter or select the parent folder:

/

- Session1 [opencoss]
  - View 1 [MAIN]
    - 1 [CLEAN]
    - 2 [CLEAN]
    - AvionicsREUSING [CLEAN]
    - EMC2 [CLEAN]
    - mcp [CLEAN]
    - PruebaAvionic [CLEAN]
    - pruebaRailway [CLEAN]
    - RailAngel [CLEAN]
    - default.evidence [CLEAN]
    - default2G.refframework_diagram [CLEAN]
    - default2G.refframework [CLEAN]
    - defaultI.property [CLEAN]
    - IRRdefault.property [CLEAN]
    - ISO_EQUIV_IRR.mapping [CLEAN]
    - ISO26262_IRR.refframework_diagram [CLEAN]
    - ISO26262_IRR.refframework [CLEAN]
    - ISO26262.refframework_diagram [CLEAN]
    - ISO26262.refframework [CLEAN]
    - ISO26262(2)_IRR.refframework_diagram [CLEAN]
    - ISO26262(4)_IRR.refframework_diagram [CLEAN]
    - ol1.refframework [CLEAN]
    - opencoss.evidence [CLEAN]
    - tailoredISO26262_IRR.refframework [CLEAN]
    - TPKIntegration.refframework_diagram [CLEAN]
    - trial.refframework_diagram [CLEAN]

Resource name: ISO26262_IRR.refframework

Figure 25 - Load Resource Reference Framework II



Enter or select the parent folder:

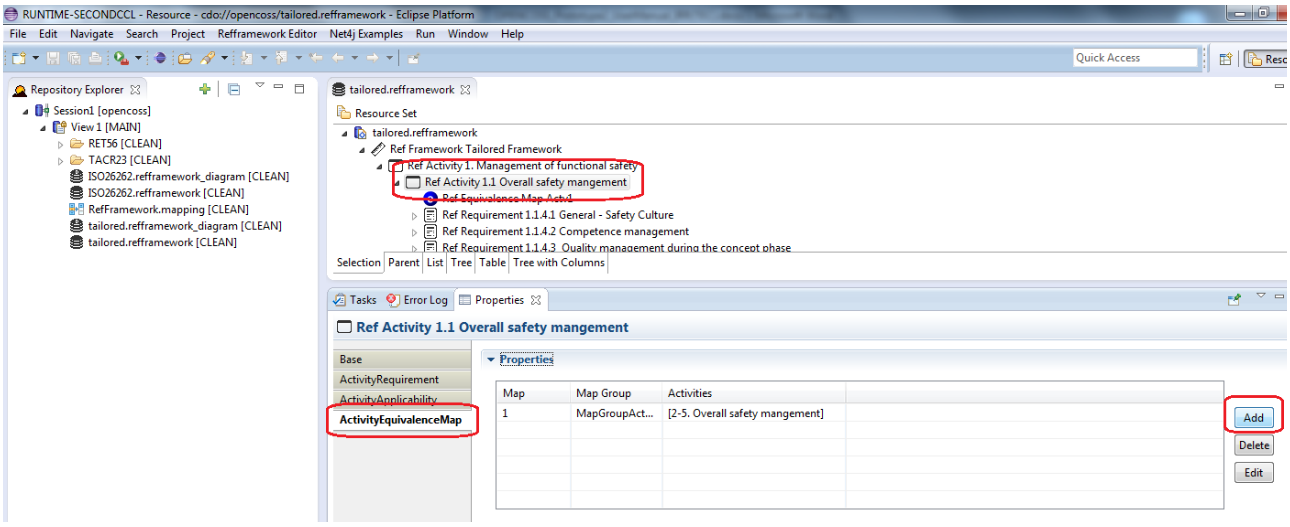
/

- Session1 [opencoss]
  - View 1 [MAIN]
    - 1 [CLEAN]
    - 2 [CLEAN]
    - AvionicsREUSING [CLEAN]
    - EMC2 [CLEAN]
    - mcp [CLEAN]
    - PruebaAvionic [CLEAN]
    - pruebaRailway [CLEAN]
    - RailAngel [CLEAN]
    - default.evidence [CLEAN]
    - default2G.refframework_diagram [CLEAN]
    - default2G.refframework [CLEAN]
    - defaultI.property [CLEAN]
    - IRRdefault.property [CLEAN]
    - ISO_EQUIV_IRR.mapping [CLEAN]
    - ISO26262_IRR.refframework_diagram [CLEAN]
    - ISO26262_IRR.refframework [CLEAN]
    - ISO26262.refframework_diagram [CLEAN]
    - ISO26262.refframework [CLEAN]
    - ISO26262(2)_IRR.refframework_diagram [CLEAN]
    - ISO26262(4)_IRR.refframework_diagram [CLEAN]
    - ol1.refframework [CLEAN]
    - opencoss.evidence [CLEAN]
    - Refframework.mapping [CLEAN]
    - tailoredISO26262_IRR.refframework [CLEAN]
    - TPKIntegration.refframework_diagram [CLEAN]
    - trial.refframework_diagram [CLEAN]

Resource name: Refframework.mapping

Figure 26 - Load Resource Map Group III

It’s possible to create equivalence maps for activities, artefacts, requirements, roles and techniques. Then, first select the object in the tree and after click on the tab “ActivityEquivalence Map” and press the button “Add”



RUNTIME-SECONDCCL - Resource - cdo://opencoss/tailored.refframework - Eclipse Platform

- Session1 [opencoss]
  - View 1 [MAIN]
    - RET56 [CLEAN]
    - TACR23 [CLEAN]
    - ISO26262.refframework_diagram [CLEAN]
    - ISO26262.refframework [CLEAN]
    - RefFramework.mapping [CLEAN]
    - tailored.refframework_diagram [CLEAN]
    - tailored.refframework [CLEAN]

Resource Set

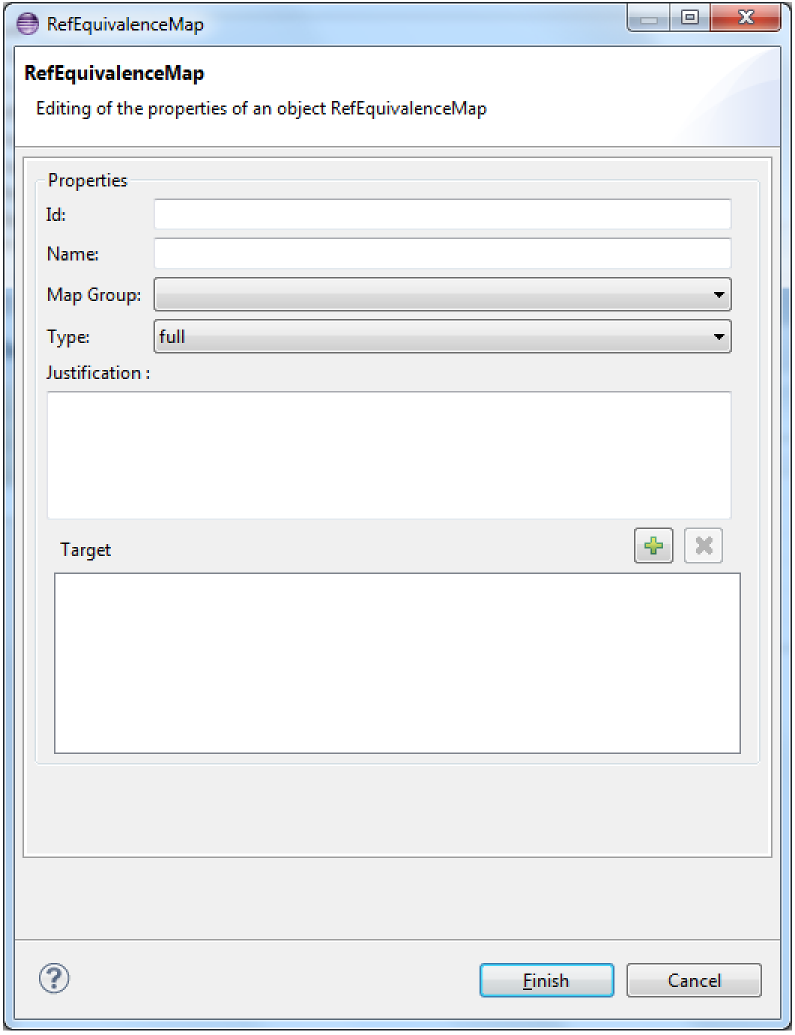
- tailored.refframework
  - Ref Framework Tailored Framework
    - Ref Activity 1. Management of functional safety
      - Ref Activity 1.1 Overall safety mangement
        - Ref Equivalence Map Actv1
        - Ref Requirement 1.1.4.1 General - Safety Culture
        - Ref Requirement 1.1.4.2 Competence management
        - Ref Requirement 1.1.4.3 Quality management during the concept phase

Ref Activity 1.1 Overall safety mangement

Map	Map Group	Activities
1	MapGroupAct...	[2-5. Overall safety mangement]

Figure 27 - Activity Equivalence Map

Finally, enter the information requested:



RefEquivalenceMap

RefEquivalenceMap

Editing of the properties of an object RefEquivalenceMap

Properties

Id:

Name:

Map Group:

Type: full

Justification :

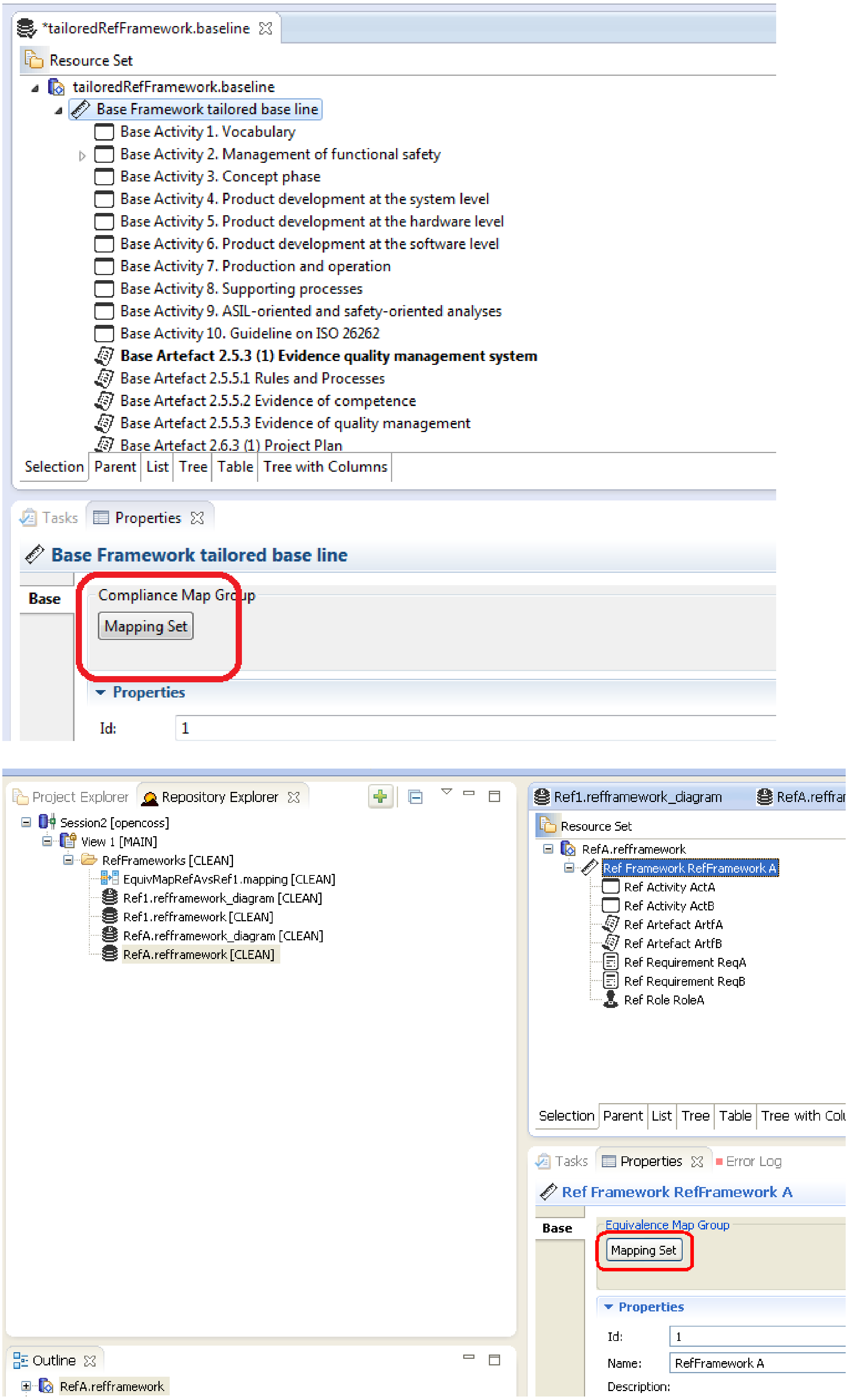
Target

Figure 28 - Equivalence Map

If the user adds as target of the equivalence an element of the source refframework, this target element will be considered as postCondition. The postConditions are mandatory extra activities, not included in the standard, that must be performed in case of reusing the target element from one assurance project based in the target refframework in another assurance project based in the source refframework using the Cross-Domain functionality that will be explained in the section put section reference.

4.3.2 Equivalence Map using a tailored functionality.

To create Equivalence Maps using the tailored functionality, first of all, it’s necessary to press the button “Mapping Set” on the properties form of the reference framework using the tree view editor (not available using the diagram editor). This window automatically saves the mappings when checking or unchecking elements of the target refframework tree.



tailoredRefFramework.baseline
Base Framework tailored base line
Base Activity 1. Vocabulary
Base Activity 2. Management of functional safety
Base Activity 3. Concept phase
Base Activity 4. Product development at the system level
Base Activity 5. Product development at the hardware level
Base Activity 6. Product development at the software level
Base Activity 7. Production and operation
Base Activity 8. Supporting processes
Base Activity 9. ASIL-oriented and safety-oriented analyses
Base Activity 10. Guideline on ISO 26262
Base Artefact 2.5.3 (1) Evidence quality management system
Base Artefact 2.5.5.1 Rules and Processes
Base Artefact 2.5.5.2 Evidence of competence
Base Artefact 2.5.5.3 Evidence of quality management
Base Artefact 2.6.3 (1) Project Plan

Id: 1

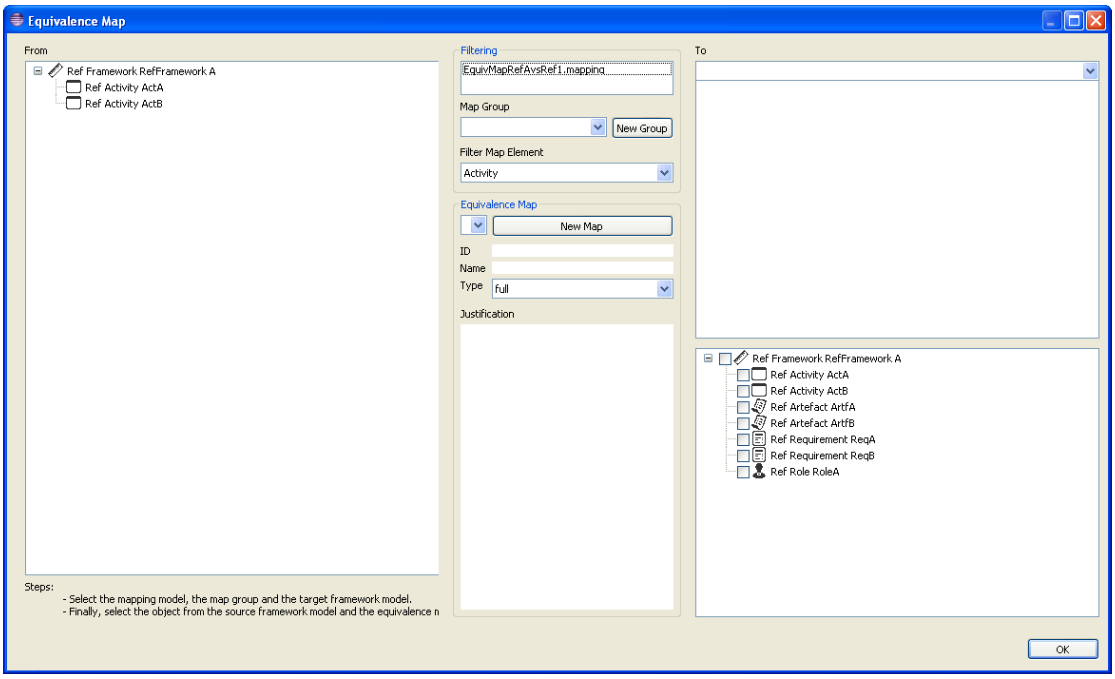
Session2 [opencoss]
View 1 [MAIN]
RefFrameworks [CLEAN]
EquivMapRefAvsRef1.mapping [CLEAN]
Ref1.refframework_diagram [CLEAN]
Ref1.refframework [CLEAN]
RefA.refframework_diagram [CLEAN]
RefA.refframework [CLEAN]

RefA.refframework

RefA.refframework
Ref Framework RefFramework A
Ref Activity ActA
Ref Activity ActB
Ref Artefact ArtfA
Ref Artefact ArtfB
Ref Requirement ReqA
Ref Requirement ReqB
Ref Role RoleA

Id: 1
Name: RefFramework A
Description:

Figure 29 - How to create Equivalence Map.



Ref Framework RefFramework A
- Ref Activity ActA
- Ref Activity ActB

EquivMapRefAvsRef1.mapping

Map Group:

Filter Map Element: Activity

ID:

Name:

Type: full

Justification:

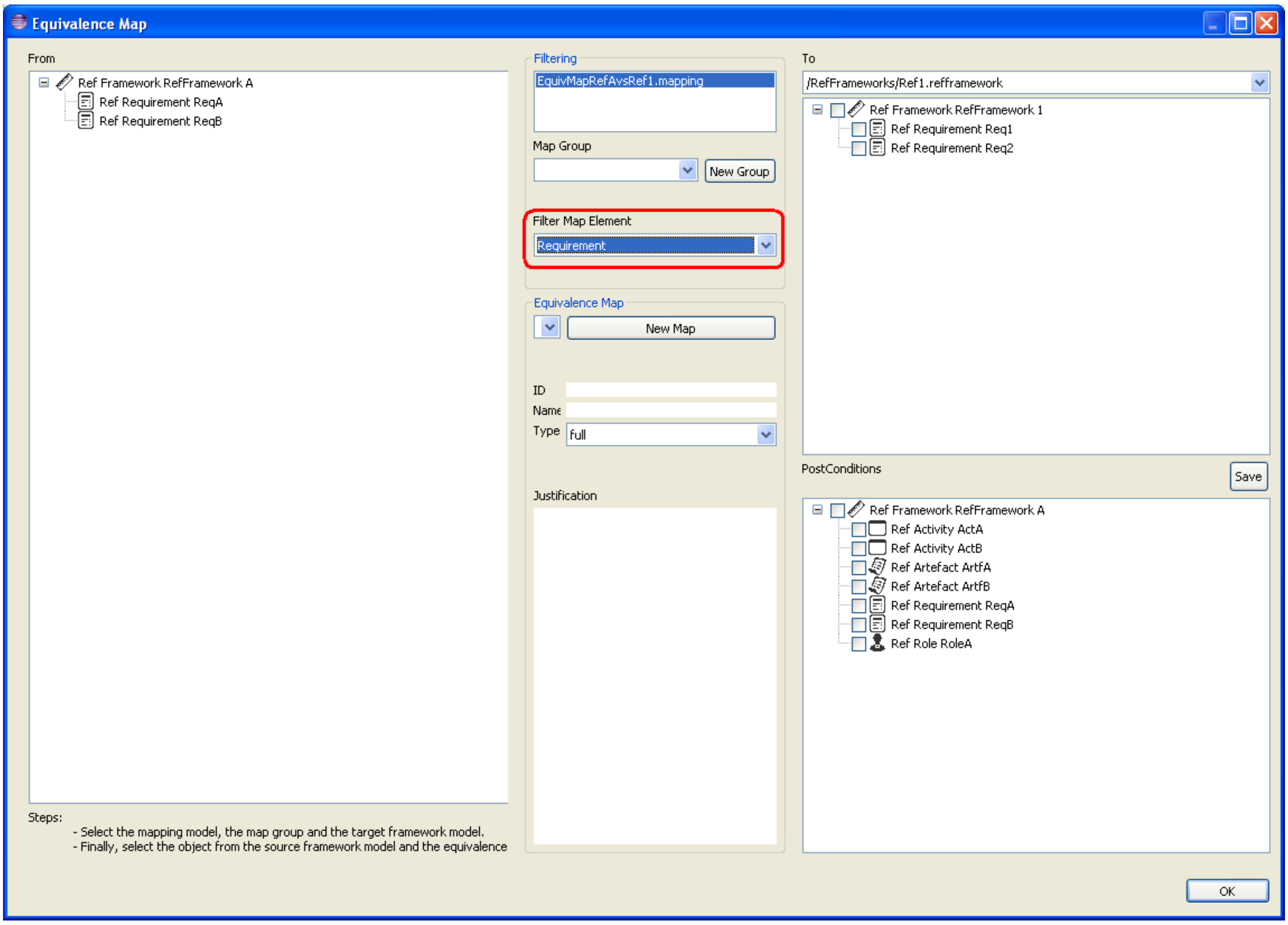
□ Ref Framework RefFramework A
- □ Ref Activity ActA
- □ Ref Activity ActB
- □ Ref Artefact ArtfA
- □ Ref Artefact ArtfB
- □ Ref Requirement ReqA
- □ Ref Requirement ReqB
- □ Ref Role RoleA

Steps:
- Select the mapping model, the map group and the target framework model.
- Finally, select the object from the source framework model and the equivalence n

Figure 30 - Equivalence Map form.

The Equivalence Map form is organized in three zones:

- The *left zone* shows the actual reference framework, and it loads the type of elements for which we want to make the equivalence maps. For default, activities.
- The *middle zone* allows to make different filters like:
    - *Filter Mapping Model* lists all the mapping models stored in the database, and it will be necessary to select one of them and one group model. It's also possible to create a new map group pressing the button "New group".
    - *Filter Map Element*. It's possible to create equivalence maps for activities, artefacts, requirements, roles and techniques. When these filter change, also it changes the information showed by the reference framework. For example:
        - If the filter "Requirement" is selected only the requirements of both refframeworks will be shown:



From:
- Ref Framework RefFramework A
  - Ref Requirement ReqA
  - Ref Requirement ReqB

Filtering: EquivMapRefAvsRef1.mapping

Filter Map Element: Requirement

ID:
Name:
Type: full

To: /RefFrameworks/Ref1.refframework
- □ Ref Framework RefFramework 1
  - □ Ref Requirement Req1
  - □ Ref Requirement Req2

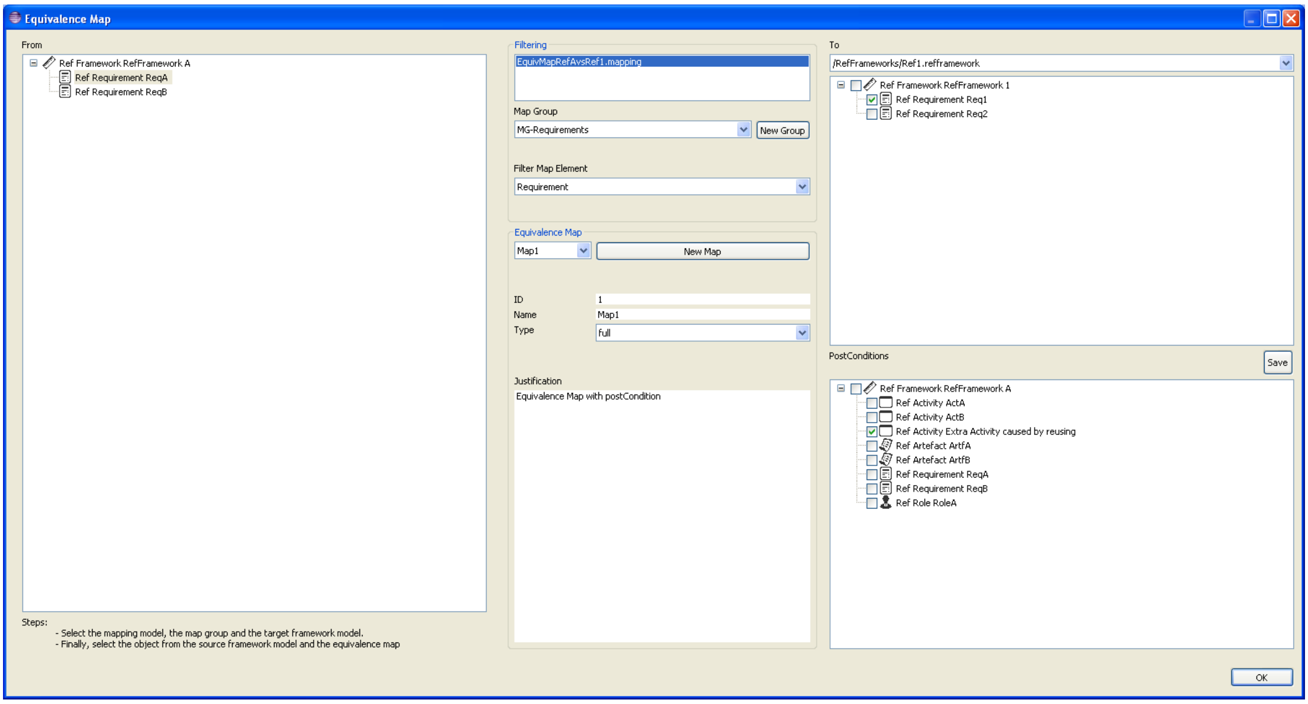
PostConditions:
- □ Ref Framework RefFramework A
  - □ Ref Activity ActA
  - □ Ref Activity ActB
  - □ Ref Artefact ArtfA
  - □ Ref Artefact ArtfB
  - □ Ref Requirement ReqA
  - □ Ref Requirement ReqB
  - □ Ref Role RoleA

Steps:
- Select the mapping model, the map group and the target framework model.
- Finally, select the object from the source framework model and the equivalence

Figure 31 - Equivalence Map, select map element (I)

- ○ *Filter Equivalence Map*. This filter allows making different equivalence maps for the same from refframework element.
- ○ The mapping information must also be introduced in the middle part by the user; this information is the ID, the name, the type and a justification text.

- The *right zone* shows two lists and a combo box.
  - ○ *The combo box*. It shows all the database refframeworks to select the reference framework that will be the target of the equivalence map to create.
  - ○ The upper list loads the elements, according to the filter selected, of the refframework chosen in the combo box that will be the target of the equivalence map to create.
  - ○ The lower list displays the full content (not filtered) of the source refframework that will be postConditions in case of reusing. The postConditions are mandatory extra activities, not included in the standard, that must be performed in case of reusing the target element from one assurance project based in the target refframework in another assurance project based in the source refframework using the Cross-Domain functionality that will be explained in the section 5.5 Cross-Domain reuse. If the user double-clicks any element of this list, the source refframework could be modified to create new element to be used as postconditions (the save button must be pressed to save the changes).



From

- ⊟ Ref Framework RefFramework A
  - Ref Requirement ReqA
  - Ref Requirement ReqB

Filtering: EquivMapRefAvsRef1.mapping

Map Group: MG-Requirements

Filter Map Element: Requirement

Equivalence Map: Map1

ID: 1

Name: Map1

Type: full

Justification: Equivalence Map with postCondition

To: /RefFrameworks/Ref1.refframework

- ⊟ □ Ref Framework RefFramework 1
  - ☑ Ref Requirement Req1
  - □ Ref Requirement Req2

PostConditions

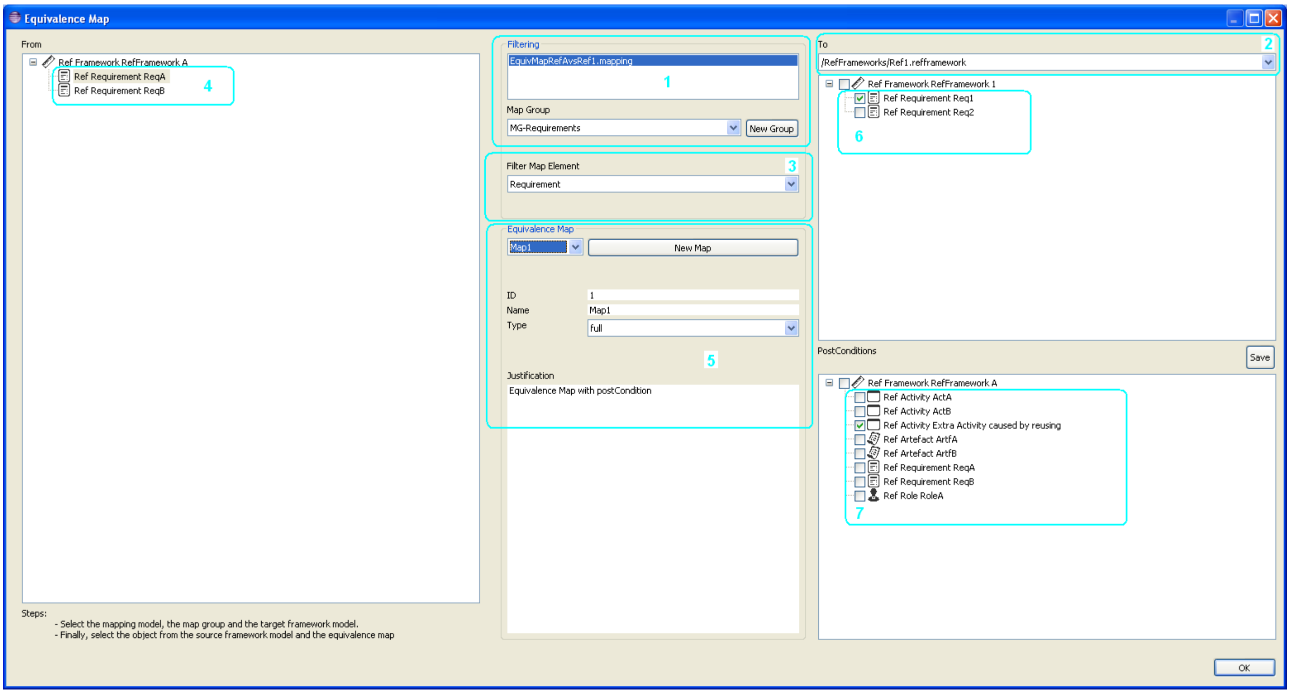
- ⊟ □ Ref Framework RefFramework A
  - □ Ref Activity ActA
  - □ Ref Activity ActB
  - ☑ Ref Activity Extra Activity caused by reusing
  - □ Ref Artefact ArtfA
  - □ Ref Artefact ArtfB
  - □ Ref Requirement ReqA
  - □ Ref Requirement ReqB
  - □ Ref Role RoleA

Steps:
- Select the mapping model, the map group and the target framework model.
- Finally, select the object from the source framework model and the equivalence map

Figure 32 - Equivalence Map with Postcondition.

For making an equivalence map, this window saves automatically the mapping information, follow the next steps:

1. Select a mapping model and a map group (or create it if needed).
2. Select the target reference framework.
3. Select the filter map element.
4. Select the element from the source reference framework.
5. Select or create the equivalence map and introduce the mapping information (ID, name, type and justification).
6. Check or uncheck the element from the target reference framework.
7. Create the postconditions if needed and check or uncheck the postconditions elements.



From

- ⊟ Ref Framework RefFramework A
  - Ref Requirement ReqA
  - Ref Requirement ReqB

Filtering: EquivMapRefAvsRef1.mapping

Map Group: MG-Requirements

Filter Map Element: Requirement

Equivalence Map: Map1

ID: 1

Name: Map1

Type: full

Justification: Equivalence Map with postCondition

To: /RefFrameworks/Ref1.refframework

- ⊟ □ Ref Framework RefFramework 1
  - ☑ Ref Requirement Req1
  - □ Ref Requirement Req2

PostConditions

- ⊟ □ Ref Framework RefFramework A
  - □ Ref Activity ActA
  - □ Ref Activity ActB
  - ☑ Ref Activity Extra Activity caused by reusing
  - □ Ref Artefact ArtfA
  - □ Ref Artefact ArtfB
  - □ Ref Requirement ReqA
  - □ Ref Requirement ReqB
  - □ Ref Role RoleA

Steps:
- Select the mapping model, the map group and the target framework model.
- Finally, select the object from the source framework model and the equivalence map

Figure 33 - Steps for making Equivalence Map.

4.4 Creating Applicability Tables

To create Applicability Tables (the naming is to cover various standards, for IEC 61508 derived standards would be Recommendation Tables) such as this one:

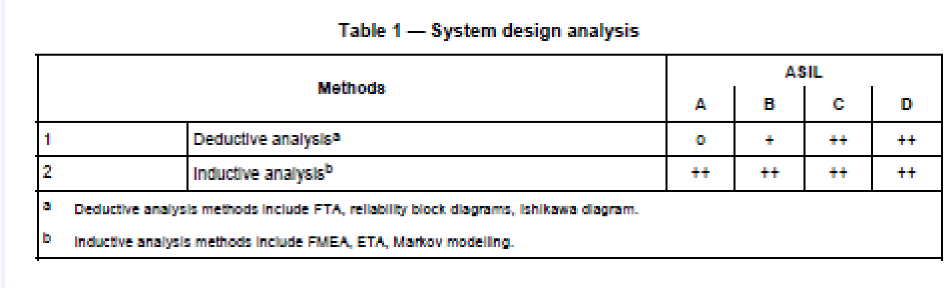


Table 1 — System design analysis

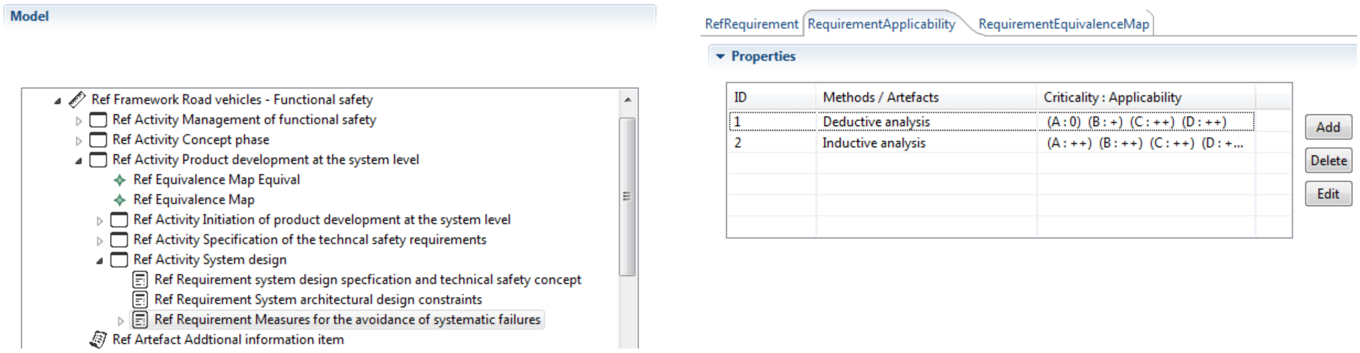
Methods		ASIL			
		A	B	C	D
1	Deductive analysis[a]	o	+	++	++
2	Inductive analysis[b]	++	++	++	++

[a] Deductive analysis methods include FTA, reliability block diagrams, Ishikawa diagram.

[b] Inductive analysis methods include FMEA, ETA, Markov modelling.

Figure 34 - Applicability Table ISO 26262

For ISO26262 and IEC 61508 standards, you must select the desired “Requirement” from the Standard, go to Tab called RequirementApplicability (to go to a Requirement Form, you must first select the Activity which contains the Requirement, and double click on the Requirement properties), and you will see:



Model

- Ref Framework Road vehicles - Functional safety
  - Ref Activity Management of functional safety
  - Ref Activity Concept phase
  - Ref Activity Product development at the system level
    - Ref Equivalence Map Equival
    - Ref Equivalence Map
    - Ref Activity Initiation of product development at the system level
    - Ref Activity Specification of the techncal safety requirements
    - Ref Activity System design
      - Ref Requirement system design specfication and technical safety concept
      - Ref Requirement System architectural design constraints
      - Ref Requirement Measures for the avoidance of systematic failures
  - Ref Artefact Addtional information item

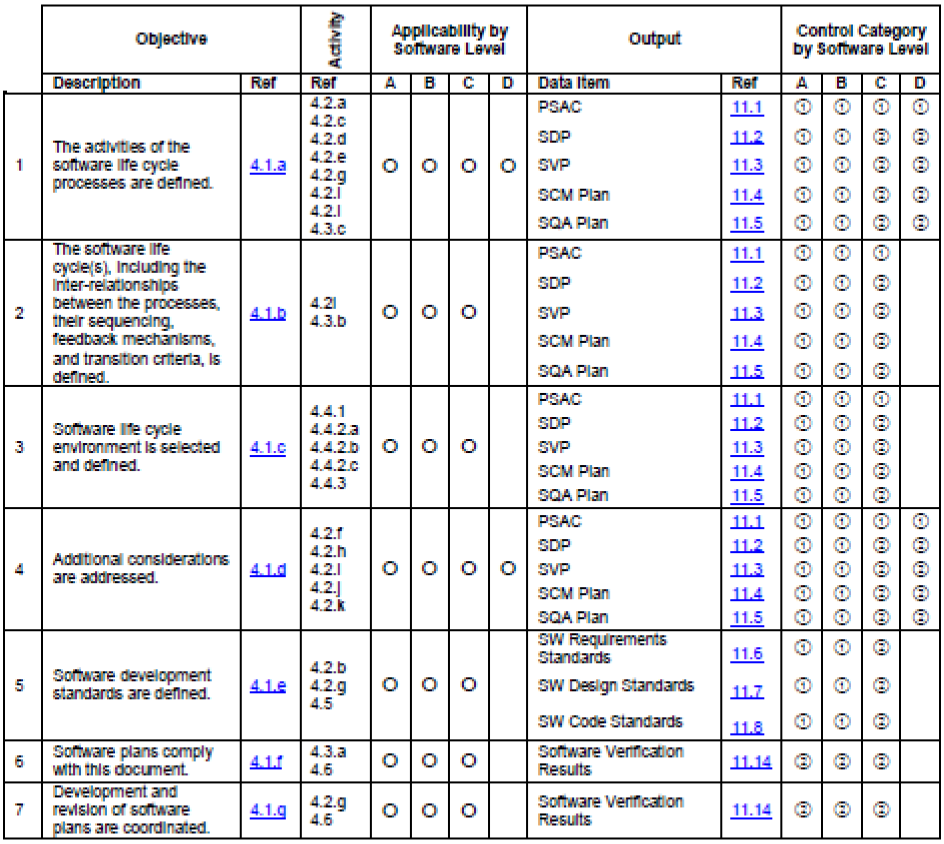
ID	Methods / Artefacts	Criticality : Applicability
1	Deductive analysis	(A : 0) (B : +) (C : ++) (D : ++)
2	Inductive analysis	(A : ++) (B : ++) (C : ++) (D : +...

Figure 35 - Requirement Applicability Table ISO 26262

Then you can add rows by defining the **target Method (technique)**, and select the Criticality Level and the Recommendation level.

NOTE: You must first create Criticality Levels (SIL) and Recommendation Levels (++, +, o, or others as required) by clicking on the Diagram (in some blank space) where you will see Properties of the RefFramework model element (the Standard).

In the case of the DO-178C standard, to create Applicability Table such as the next figure:



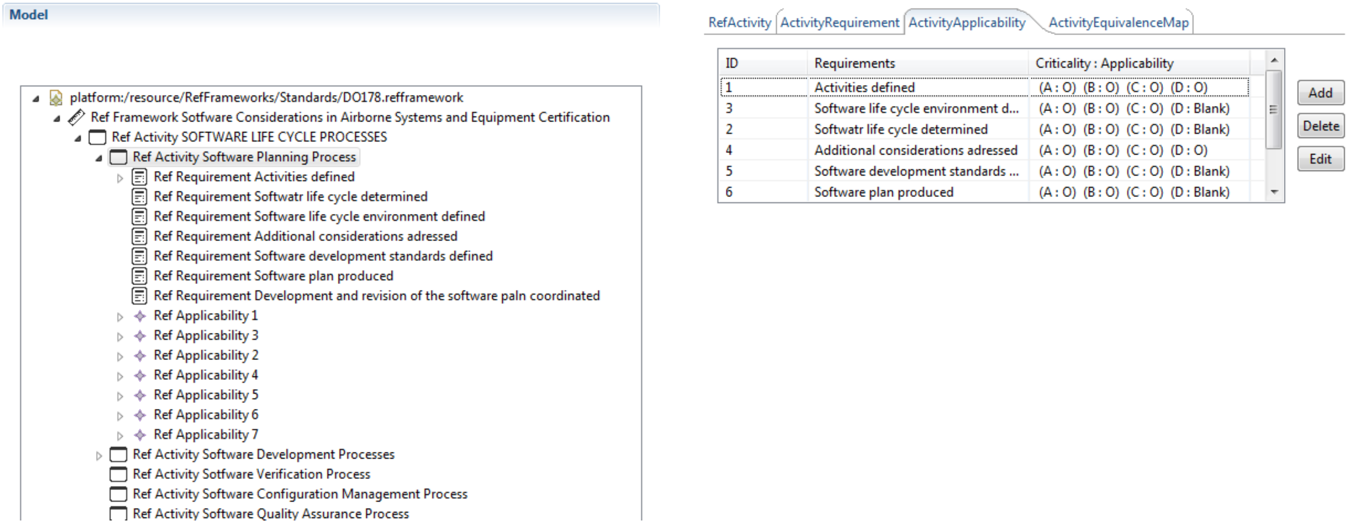
	Objective		Activity	Applicability by Software Level				Output		Control Category by Software Level			
	Description	Ref	Ref	A	B	C	D	Data Item	Ref	A	B	C	D
1	The activities of the software life cycle processes are defined.	4.1.a	4.2.a 4.2.c 4.2.d 4.2.e 4.2.g 4.2.i 4.2.l 4.3.c	○	○	○	○	PSAC SDP SVP SCM Plan SQA Plan	11.1 11.2 11.3 11.4 11.5	① ① ① ① ①	① ① ① ① ①	① ② ② ② ②	① ② ② ② ②
2	The software life cycle(s), including the inter-relationships between the processes, their sequencing, feedback mechanisms, and transition criteria, is defined.	4.1.b	4.2i 4.3.b	○	○	○		PSAC SDP SVP SCM Plan SQA Plan	11.1 11.2 11.3 11.4 11.5	① ① ① ① ①	① ① ① ① ①	① ② ② ② ②	
3	Software life cycle environment is selected and defined.	4.1.c	4.4.1 4.4.2.a 4.4.2.b 4.4.2.c 4.4.3	○	○	○		PSAC SDP SVP SCM Plan SQA Plan	11.1 11.2 11.3 11.4 11.5	① ① ① ① ①	① ① ① ① ①	① ② ② ② ②	
4	Additional considerations are addressed.	4.1.d	4.2.f 4.2.h 4.2.i 4.2.j 4.2.k	○	○	○	○	PSAC SDP SVP SCM Plan SQA Plan	11.1 11.2 11.3 11.4 11.5	① ① ① ① ①	① ① ① ① ①	① ② ② ② ②	① ② ② ② ②
5	Software development standards are defined.	4.1.e	4.2.b 4.2.g 4.5	○	○	○		SW Requirements Standards SW Design Standards SW Code Standards	11.6 11.7 11.8	① ① ①	① ① ①	② ② ②	
6	Software plans comply with this document.	4.1.f	4.3.a 4.6	○	○	○		Software Verification Results	11.14	②	②	②	
7	Development and revision of software plans are coordinated.	4.1.g	4.2.g 4.6	○	○	○		Software Verification Results	11.14	②	②	②	

Figure 36 - Applicability Table DO-178C

It needs to make two steps:

1. First, it needs to define the applicability table for the activities: select the desired "Activity" from the Standard, go to Tab called ActivityApplicability.

   Then you can add rows by defining the **target Requirement**, and select the Criticality Level and the Recommendation level.



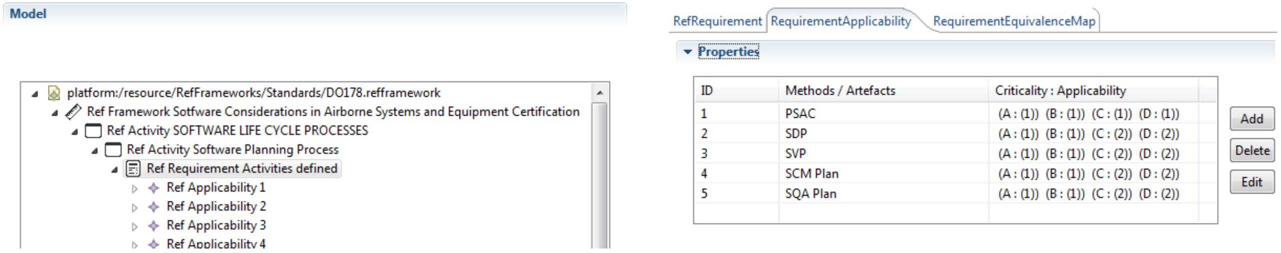
platform:/resource/RefFrameworks/Standards/DO178.refframework
Ref Framework Software Considerations in Airborne Systems and Equipment Certification
Ref Activity SOFTWARE LIFE CYCLE PROCESSES
Ref Activity Software Planning Process
Ref Requirement Activities defined
Ref Requirement Softwatr life cycle determined
Ref Requirement Software life cycle environment defined
Ref Requirement Additional considerations adressed
Ref Requirement Software development standards defined
Ref Requirement Software plan produced
Ref Requirement Development and revision of the software paln coordinated
Ref Applicability 1
Ref Applicability 3
Ref Applicability 2
Ref Applicability 4
Ref Applicability 5
Ref Applicability 6
Ref Applicability 7
Ref Activity Software Development Processes
Ref Activity Software Verification Process
Ref Activity Software Configuration Management Process
Ref Activity Software Quality Assurance Process

ID	Requirements	Criticality : Applicability
1	Activities defined	(A : O) (B : O) (C : O) (D : O)
3	Software life cycle environment d...	(A : O) (B : O) (C : O) (D : Blank)
2	Softwatr life cycle determined	(A : O) (B : O) (C : O) (D : Blank)
4	Additional considerations adressed	(A : O) (B : O) (C : O) (D : O)
5	Software development standards ...	(A : O) (B : O) (C : O) (D : Blank)
6	Software plan produced	(A : O) (B : O) (C : O) (D : Blank)

Figure 37 - Activity Applicability Table DO-178C

1. And finally, it needs to define the applicability table for the requirements: select the desired "Requirement" from the Standard, go to Tab called RequirementApplicability.

   Then you can add rows by defining **the target Artefact**, and select the Criticality Level and the Recommendation level.



platform:/resource/RefFrameworks/Standards/DO178.refframework
Ref Framework Software Considerations in Airborne Systems and Equipment Certification
Ref Activity SOFTWARE LIFE CYCLE PROCESSES
Ref Activity Software Planning Process
Ref Requirement Activities defined
Ref Applicability 1
Ref Applicability 2
Ref Applicability 3
Ref Applicability 4

ID	Methods / Artefacts	Criticality : Applicability
1	PSAC	(A : (1)) (B : (1)) (C : (1)) (D : (1))
2	SDP	(A : (1)) (B : (1)) (C : (2)) (D : (2))
3	SVP	(A : (1)) (B : (1)) (C : (2)) (D : (2))
4	SCM Plan	(A : (1)) (B : (1)) (C : (2)) (D : (2))
5	SQA Plan	(A : (1)) (B : (1)) (C : (2)) (D : (2))

Figure 38 - Requirement Applicability Table DO-178C

In summary:

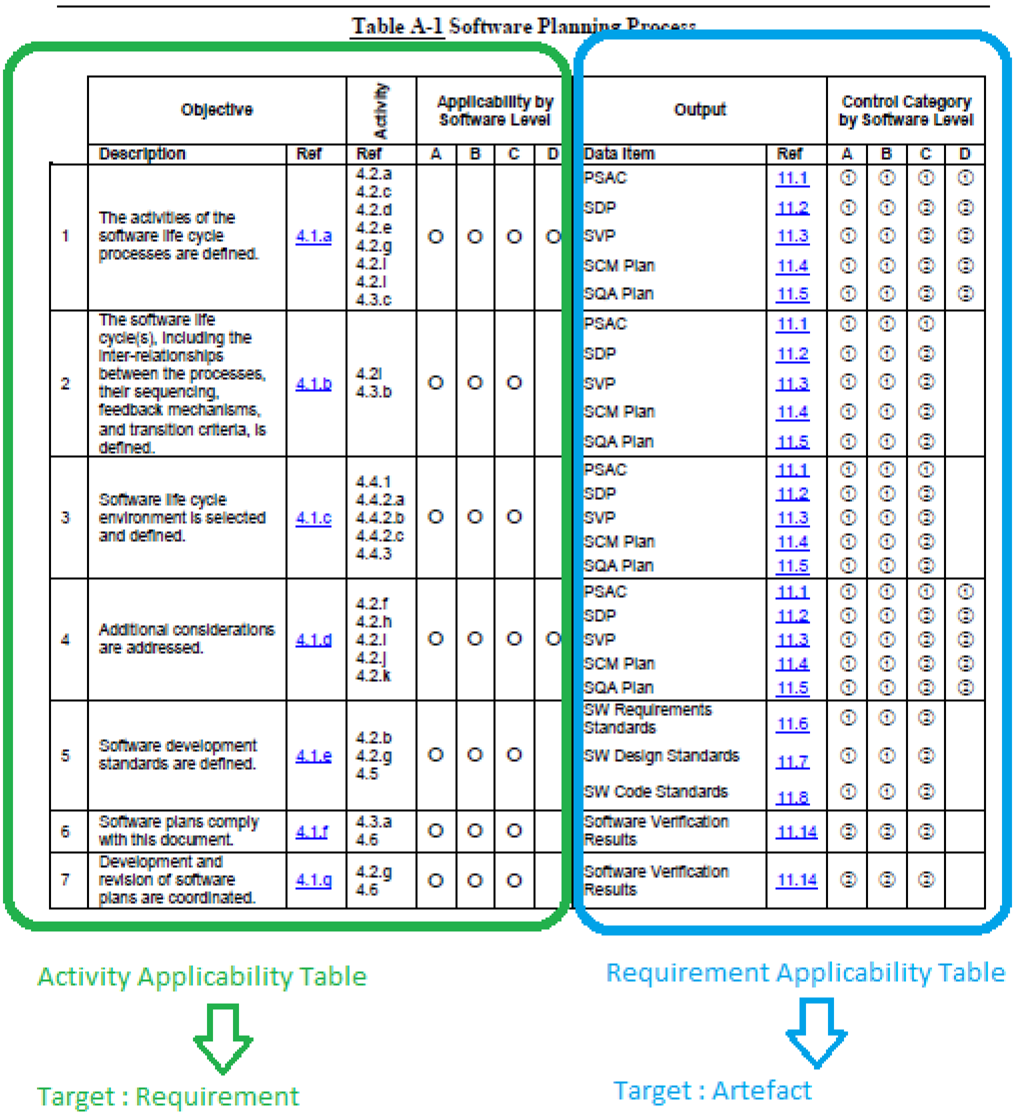


Table A-1 Software Planning Process

	Objective		Activity	Applicability by Software Level				Output		Control Category by Software Level			
	Description	Ref	Ref	A	B	C	D	Data Item	Ref	A	B	C	D
1	The activities of the software life cycle processes are defined.	4.1.a	4.2.a 4.2.c 4.2.d 4.2.e 4.2.g 4.2.i 4.2.l 4.3.c	○	○	○	○	PSAC SDP SVP SCM Plan SQA Plan	11.1 11.2 11.3 11.4 11.5	① ① ① ① ①	① ① ① ① ①	① ② ② ② ②	① ② ② ② ②
2	The software life cycle(s), including the inter-relationships between the processes, their sequencing, feedback mechanisms, and transition criteria, is defined.	4.1.b	4.2l 4.3.b	○	○	○		PSAC SDP SVP SCM Plan SQA Plan	11.1 11.2 11.3 11.4 11.5	① ① ① ① ①	① ① ① ① ①	① ② ② ② ②	
3	Software life cycle environment is selected and defined.	4.1.c	4.4.1 4.4.2.a 4.4.2.b 4.4.2.c 4.4.3	○	○	○		PSAC SDP SVP SCM Plan SQA Plan	11.1 11.2 11.3 11.4 11.5	① ① ① ① ①	① ① ① ① ①	① ② ② ② ②	
4	Additional considerations are addressed.	4.1.d	4.2.f 4.2.h 4.2.i 4.2.j 4.2.k	○	○	○	○	PSAC SDP SVP SCM Plan SQA Plan	11.1 11.2 11.3 11.4 11.5	① ① ① ① ①	① ① ① ① ①	① ② ② ② ②	① ② ② ② ②
5	Software development standards are defined.	4.1.e	4.2.b 4.2.g 4.5	○	○	○		SW Requirements Standards SW Design Standards SW Code Standards	11.6 11.7 11.8	① ① ①	① ① ①	② ② ②	
6	Software plans comply with this document.	4.1.f	4.3.a 4.6	○	○	○		Software Verification Results	11.14	②	②	②	
7	Development and revision of software plans are coordinated.	4.1.g	4.2.g 4.6	○	○	○		Software Verification Results	11.14	②	②	②	

Figure 39 - Summary Applicability Table DO-178C

5 Assurance Project Management

An Assurance Project has three main elements:

1. **Baseline Configuration**: a Baseline Configuration has a set of Baseline Models. Each baseline model results from importing (copying) a Reference Framework model and adding information about its Selection in the current project (it answers to the question: does a given Reference Framework model element apply to the current Assurance Project?). A Baseline model represents what is planned to do or to comply with, in a specific assurance project.
2. **Permissions Configuration**. This has not been implemented yet. It will support profile creation to enable restricted access to OPENCOSS functionality and data.
3. **Assurance Assets Package**. This is a pointer to project-specific Artefacts models, and Argumentation models, and Process models. These three models represent what has been done in a specific assurance project. The mapping of these three models with Baseline Models is modelled using the concept of Compliance Map.

One Assurance Project can have multiple Baseline Configurations, Permissions Configurations and Assurance Assets Package, but only one is active at once.

The next figure illustrates the elements of an Assurance Project:

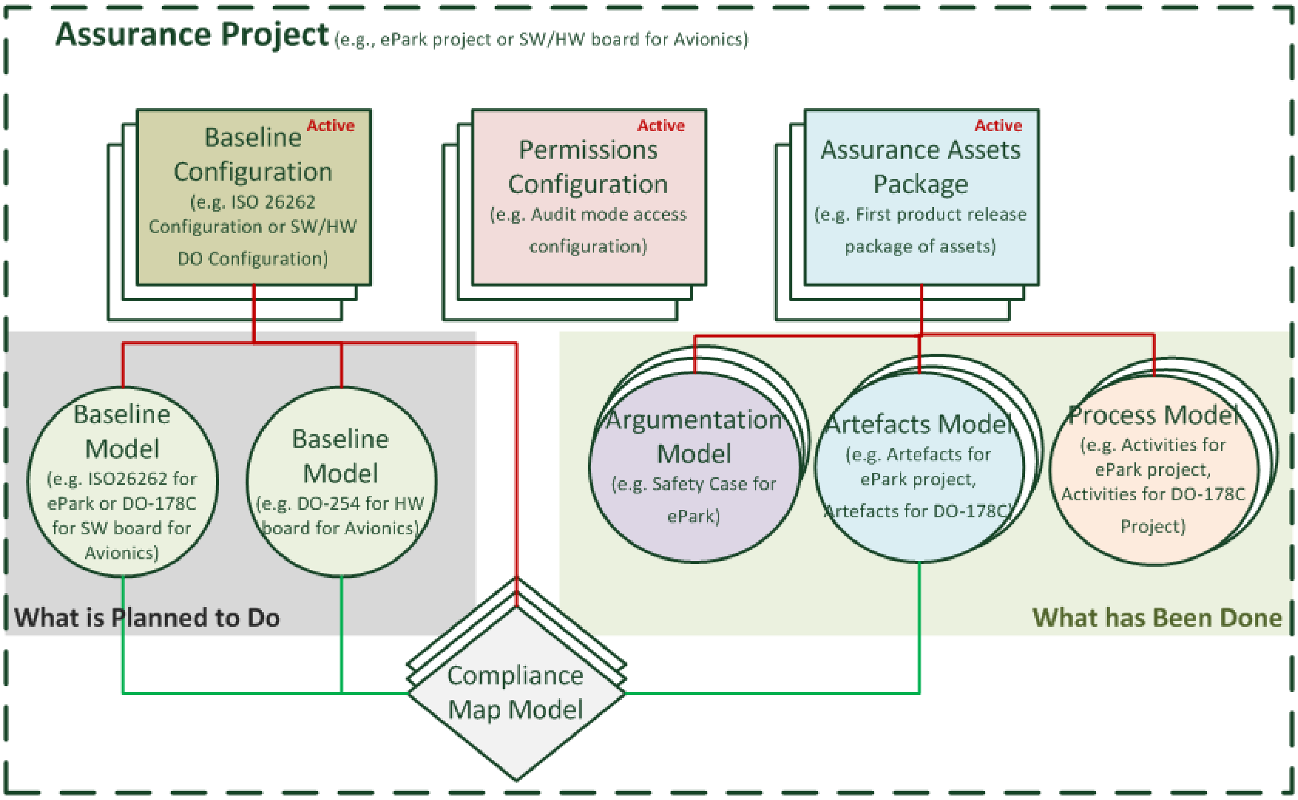

Assurance Project (e.g., ePark project or SW/HW board for Avionics)
Active
Baseline Configuration (e.g. ISO 26262 Configuration or SW/HW DO Configuration)
Active
Permissions Configuration (e.g. Audit mode access configuration)
Active
Assurance Assets Package (e.g. First product release package of assets)
Baseline Model (e.g. ISO26262 for ePark or DO-178C for SW board for Avionics)
Baseline Model (e.g. DO-254 for HW board for Avionics)
Argumentation Model (e.g. Safety Case for ePark)
Artefacts Model (e.g. Artefacts for ePark project, Artefacts for DO-178C)
Process Model (e.g. Activities for ePark project, Activities for DO-178C Project)
What is Planned to Do
What has Been Done
Compliance Map Model

Figure 40 - Assurance Project structure

5.1 Create Assurance Project and Baseline

To create a new assurance project go to the menu File→ New → Project or use the button in the top button bar and select New Assurance Project inside the Opencoss category.

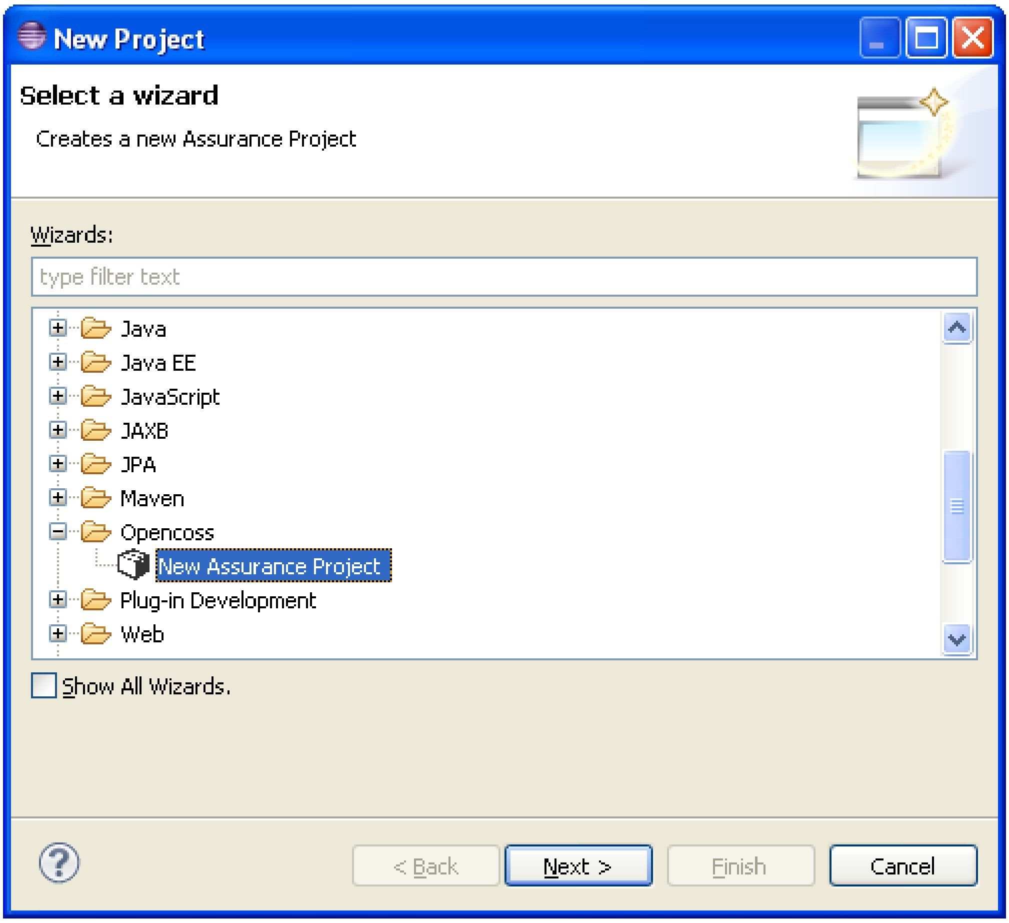
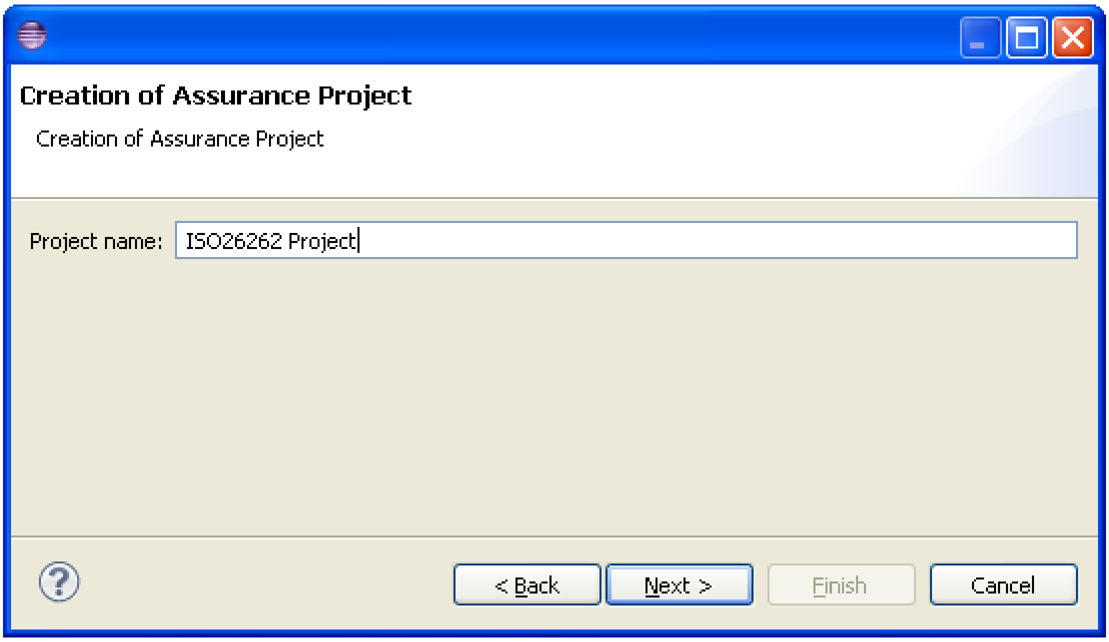


Figure 41 - New Assurance Project wizard

The first page is to enter the name of Assurance project.



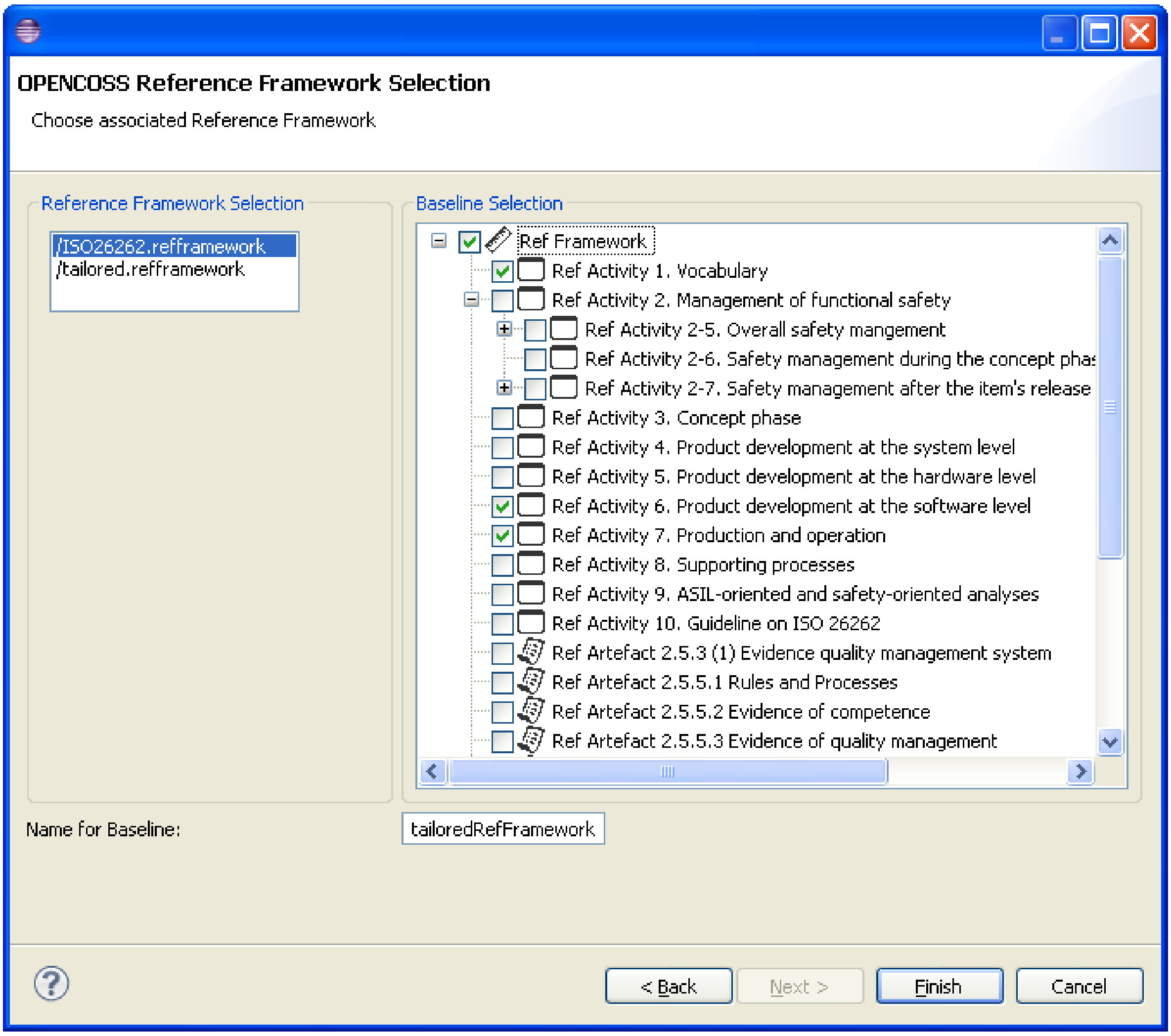
Creation of Assurance Project

Creation of Assurance Project

Project name: ISO26262 Project

Figure 42 - Assurance Project name page

The next page of the wizard will show in the left the list of reference framework model in the whole repository. Select the desired refframework and in the right list will appear its contents in form of checkable tree for the generation of the baseline. Select the nodes of the tree that will be applied to the project are creating, give a name to the baseline and click the Finish button to generate all the project information (This process could take several seconds). Only is possible to Finish the process if you give a name and select almost one concept.



OPENCOSS Reference Framework Selection

Choose associated Reference Framework

Reference Framework Selection

/ISO26262.refframework
/tailored.refframework

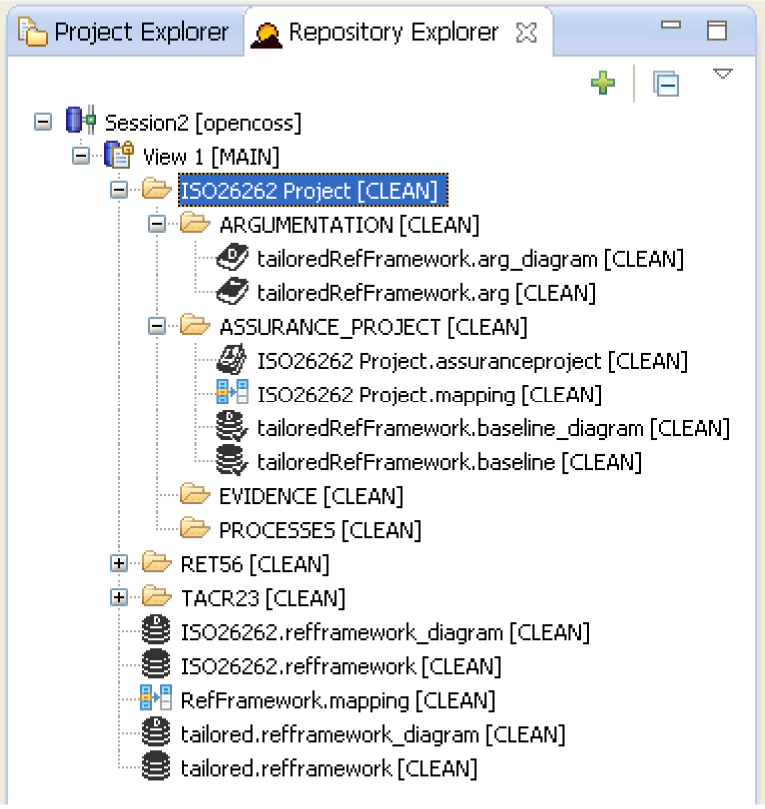
Baseline Selection

- ☑ Ref Framework
  - ☑ Ref Activity 1. Vocabulary
  - □ Ref Activity 2. Management of functional safety
    - □ Ref Activity 2-5. Overall safety mangement
    - □ Ref Activity 2-6. Safety management during the concept phas
    - □ Ref Activity 2-7. Safety management after the item's release
  - □ Ref Activity 3. Concept phase
  - □ Ref Activity 4. Product development at the system level
  - □ Ref Activity 5. Product development at the hardware level
  - ☑ Ref Activity 6. Product development at the software level
  - ☑ Ref Activity 7. Production and operation
  - □ Ref Activity 8. Supporting processes
  - □ Ref Activity 9. ASIL-oriented and safety-oriented analyses
  - □ Ref Activity 10. Guideline on ISO 26262
  - □ Ref Artefact 2.5.3 (1) Evidence quality management system
  - □ Ref Artefact 2.5.5.1 Rules and Processes
  - □ Ref Artefact 2.5.5.2 Evidence of competence
  - □ Ref Artefact 2.5.5.3 Evidence of quality management

Name for Baseline: tailoredRefFramework

Figure 43 - Reframework selection

Now in the Repository Explorer the new project will be displayed.



```
Session2 [opencoss]
  View 1 [MAIN]
    ISO26262 Project [CLEAN]
      ARGUMENTATION [CLEAN]
        tailoredRefFramework.arg_diagram [CLEAN]
        tailoredRefFramework.arg [CLEAN]
      ASSURANCE_PROJECT [CLEAN]
        ISO26262 Project.assuranceproject [CLEAN]
        ISO26262 Project.mapping [CLEAN]
        tailoredRefFramework.baseline_diagram [CLEAN]
        tailoredRefFramework.baseline [CLEAN]
      EVIDENCE [CLEAN]
      PROCESSES [CLEAN]
    RET56 [CLEAN]
    TACR23 [CLEAN]
    ISO26262.refframework_diagram [CLEAN]
    ISO26262.refframework [CLEAN]
    RefFramework.mapping [CLEAN]
    tailored.refframework_diagram [CLEAN]
    tailored.refframework [CLEAN]
```

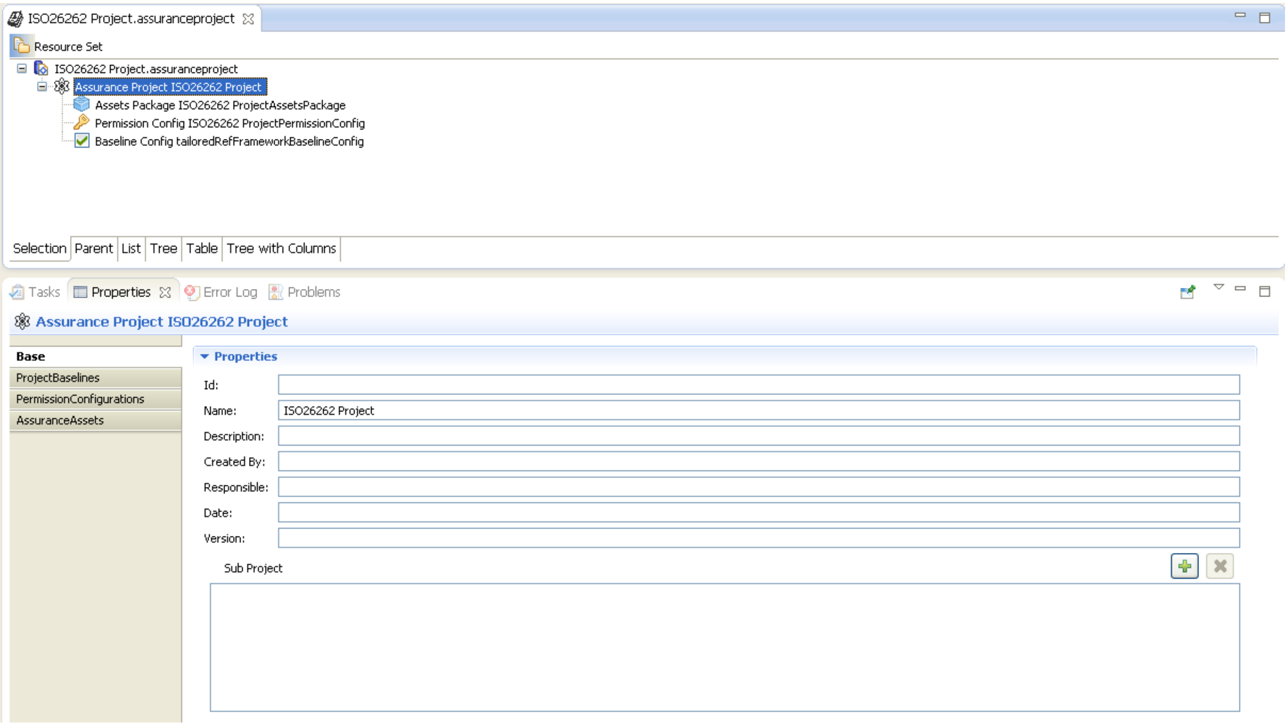
Figure 44 - Assurance Project structure

The project is composed by 4 folders:

- Argumentation for storing the argumentation models with and argumentation model (with diagram) generated automatically based on the baseline's selected entities. (For details, see section 6.2.2 Creating a Diagram at the project creation time)
- Assurance Project folder that has the project information in .assuranceproject model, the baseline information in .baseline model(with diagram) and the .mapping model to store the compliance mapping information.
- Evidence for saving the evidence models
- Process for the processes execution.

To edit the Assurance Project information double clicks over the model and its editor will appear. By default the assurance project has related all the models generated automatically, the baseline and mapping models in the active BaselineConfig and the argumentation model in the active AssetsPackage.

If the user generates new models related to the assurance project, for example evidence model, he must select the right folder (EVIDENCE following with the example) of the assurance project as destination for the new model and update manually the assurance project model to reference the new models inside the project (AssesuranceAssents following with the example).



ISO26262 Project.assuranceproject

Resource Set

- ISO26262 Project.assuranceproject
  - Assurance Project ISO26262 Project
    - Assets Package ISO26262 ProjectAssetsPackage
    - Permission Config ISO26262 ProjectPermissionConfig
    - Baseline Config tailoredRefFrameworkBaselineConfig

Assurance Project ISO26262 Project

Id:

Name: ISO26262 Project

Description:

Created By:

Responsible:

Date:

Version:

Sub Project

Figure 45 - Assurance Project editor

5.2 Create or update Project Baseline

To create a new assurance project baseline or update and exiting one select menu File→New → Other or use the arrow in the right of the button in the top button bar and select Other.

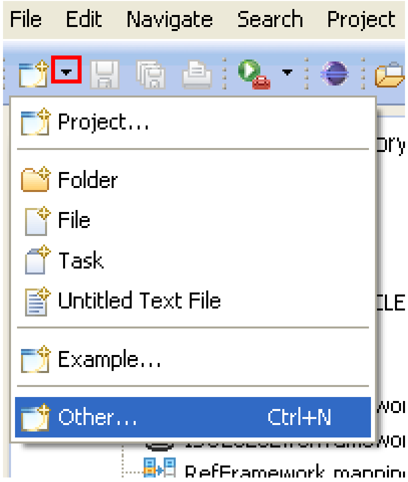
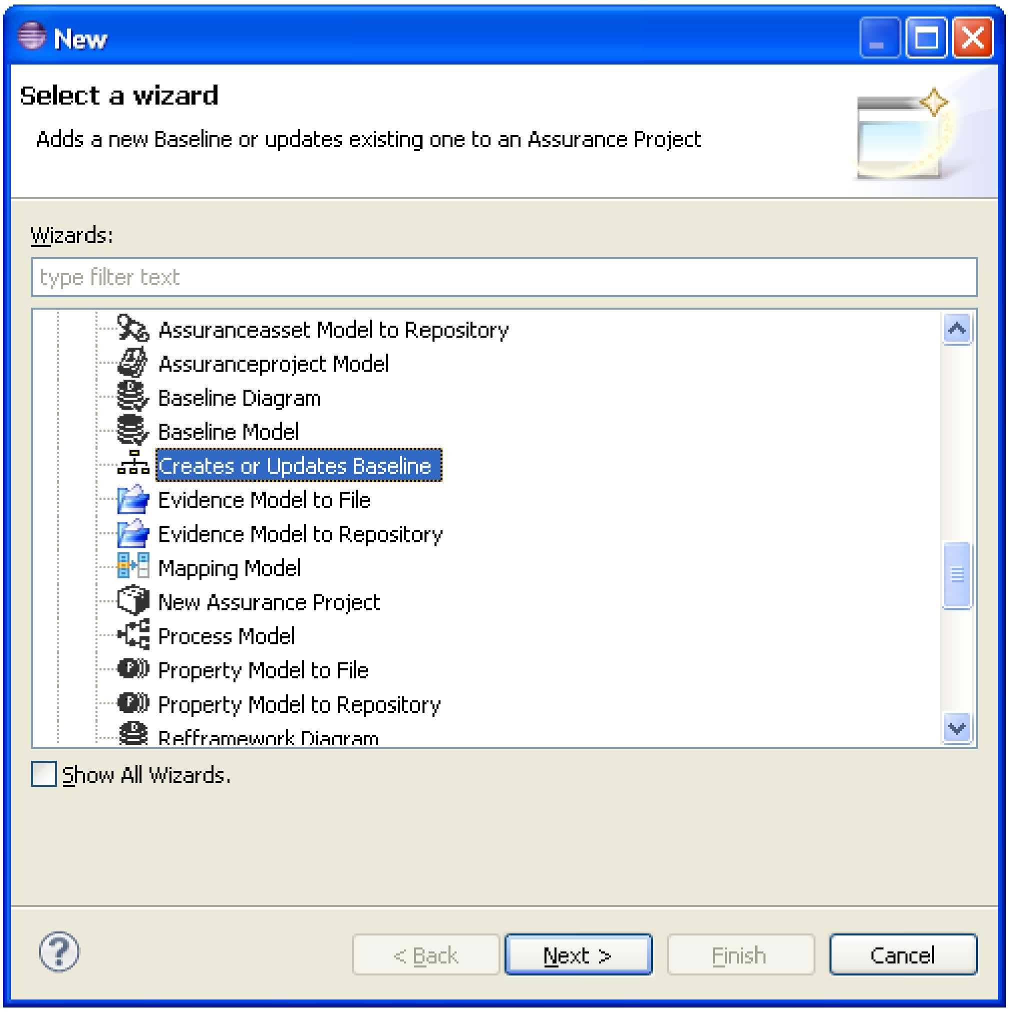


Figure 46 - Other kind of projects option

Choose the wizard Creates or Updates Baseline behind the Opencoss category.



New

Select a wizard

Adds a new Baseline or updates existing one to an Assurance Project

Wizards:

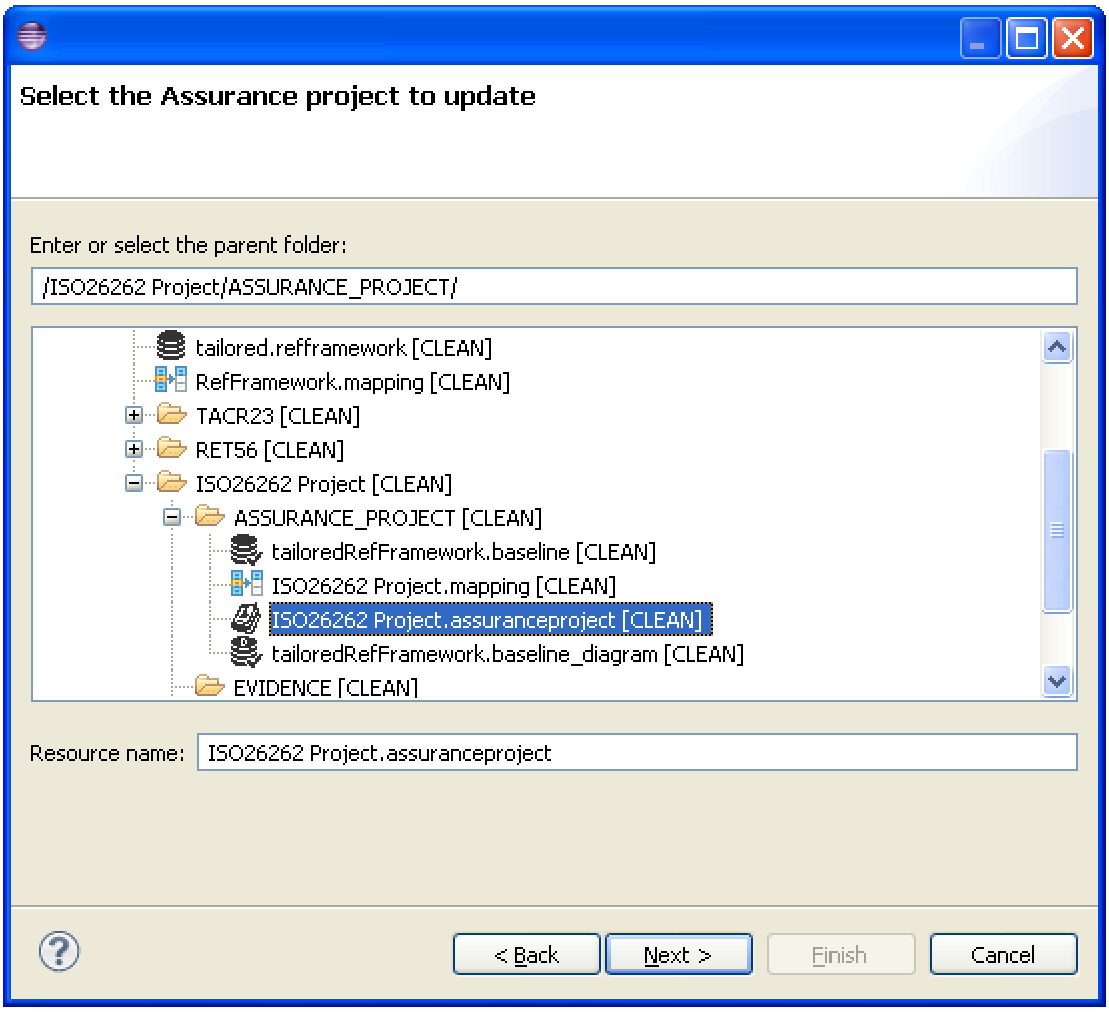
type filter text

- Assuranceasset Model to Repository
- Assuranceproject Model
- Baseline Diagram
- Baseline Model
- Creates or Updates Baseline
- Evidence Model to File
- Evidence Model to Repository
- Mapping Model
- New Assurance Project
- Process Model
- Property Model to File
- Property Model to Repository
- Refframework Diagram

□ Show All Wizards.

Figure 47 - Creates or Updates Baseline wizard

The first page of the wizard requests the selection of the assurance project model to update.



Select the Assurance project to update

Enter or select the parent folder:

/ISO26262 Project/ASSURANCE_PROJECT/

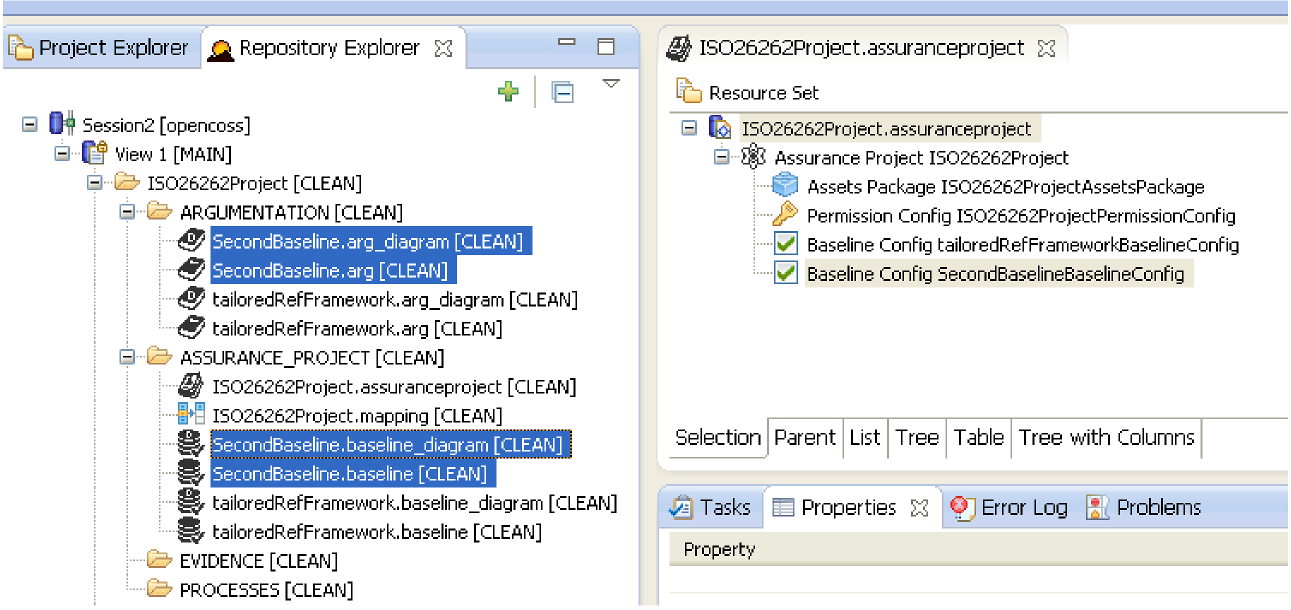
tailored.refframework [CLEAN]
RefFramework.mapping [CLEAN]
TACR23 [CLEAN]
RET56 [CLEAN]
ISO26262 Project [CLEAN]
ASSURANCE_PROJECT [CLEAN]
tailoredRefFramework.baseline [CLEAN]
ISO26262 Project.mapping [CLEAN]
ISO26262 Project.assuranceproject [CLEAN]
tailoredRefFramework.baseline_diagram [CLEAN]
EVIDENCE [CLEAN]

Resource name: ISO26262 Project.assuranceproject

< Back
Next >
Finish
Cancel

Figure 48 - Selection of the Assurance Project to update

The following steps are exactly the same than for the generation of a new assurance project.
Select the desired reference framework model to be used as source for the generation of the baseline in the left list, then in the right list will appear its contents in form of checkable tree for the generation of the baseline. Select the nodes of the tree that will be applied to this baseline and give a name to the baseline taking into account that if the given name is the same as previous existing baseline, the contents of the previous one will be replaced with the information selected and the same will occur with the argumentation model.
Finally click the Finish button to generate the new baseline and argumentation models that will be added to the assurance project model and stored in the appropriate Assurance Project Folders.



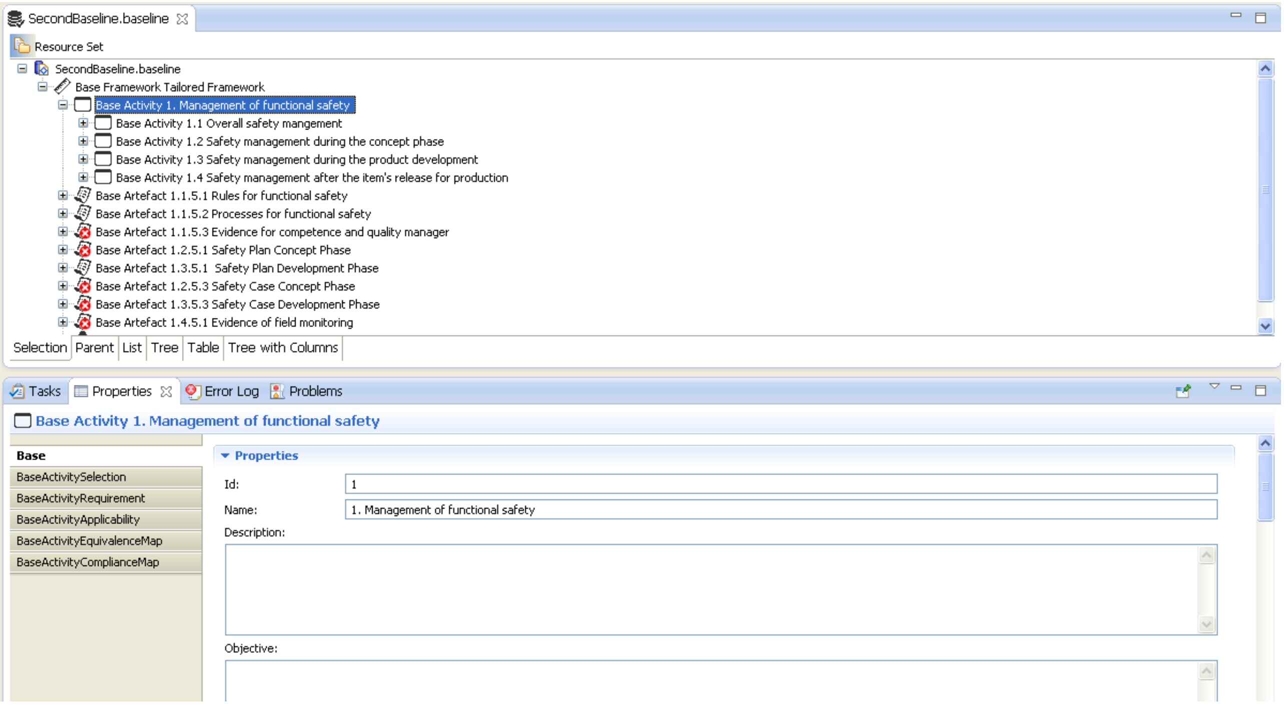
```
Session2 [opencoss]
  View 1 [MAIN]
    ISO26262Project [CLEAN]
      ARGUMENTATION [CLEAN]
        SecondBaseline.arg_diagram [CLEAN]
        SecondBaseline.arg [CLEAN]
        tailoredRefFramework.arg_diagram [CLEAN]
        tailoredRefFramework.arg [CLEAN]
      ASSURANCE_PROJECT [CLEAN]
        ISO26262Project.assuranceproject [CLEAN]
        ISO26262Project.mapping [CLEAN]
        SecondBaseline.baseline_diagram [CLEAN]
        SecondBaseline.baseline [CLEAN]
        tailoredRefFramework.baseline_diagram [CLEAN]
        tailoredRefFramework.baseline [CLEAN]
      EVIDENCE [CLEAN]
      PROCESSES [CLEAN]
```

```
ISO26262Project.assuranceproject
  Assurance Project ISO26262Project
    Assets Package ISO26262ProjectAssetsPackage
    Permission Config ISO26262ProjectPermissionConfig
    Baseline Config tailoredRefFrameworkBaselineConfig
    Baseline Config SecondBaselineBaselineConfig
```

Figure 49 - Assurance Project with new baseline

5.3 Edit Project Baseline

To edit the baseline information double click over the .baseline model and its editor View will appear. The not selected elements will be displayed in the upper tree with a different icon.



```
SecondBaseline.baseline
  Base Framework Tailored Framework
    Base Activity 1. Management of functional safety
      Base Activity 1.1 Overall safety mangement
      Base Activity 1.2 Safety management during the concept phase
      Base Activity 1.3 Safety management during the product development
      Base Activity 1.4 Safety management after the item's release for production
    Base Artefact 1.1.5.1 Rules for functional safety
    Base Artefact 1.1.5.2 Processes for functional safety
    Base Artefact 1.1.5.3 Evidence for competence and quality manager
    Base Artefact 1.2.5.1 Safety Plan Concept Phase
    Base Artefact 1.3.5.1  Safety Plan Development Phase
    Base Artefact 1.2.5.3 Safety Case Concept Phase
    Base Artefact 1.3.5.3 Safety Case Development Phase
    Base Artefact 1.4.5.1 Evidence of field monitoring
```

Base Activity 1. Management of functional safety

Id: 1

Name: 1. Management of functional safety

Description:

Objective:

Figure 50 - Baseline editor

The baseline model can be edited also be means of a graphical editor, to use it double click in the .baseline_diagram model. The way of using this editor is exactly equal than the refframework's editor explained in the chapter 4.2

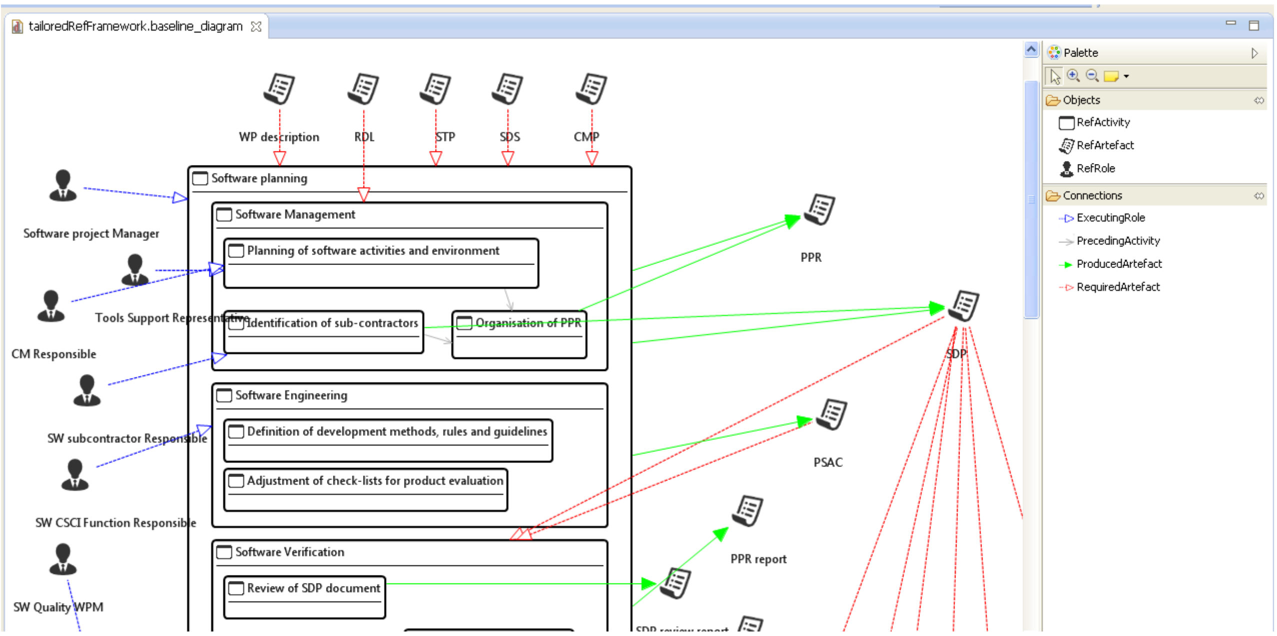


Figure 51 - Baseline graphical editor

5.4 Edit Compliance Maps

It is possible to create Compliance Maps in two ways:

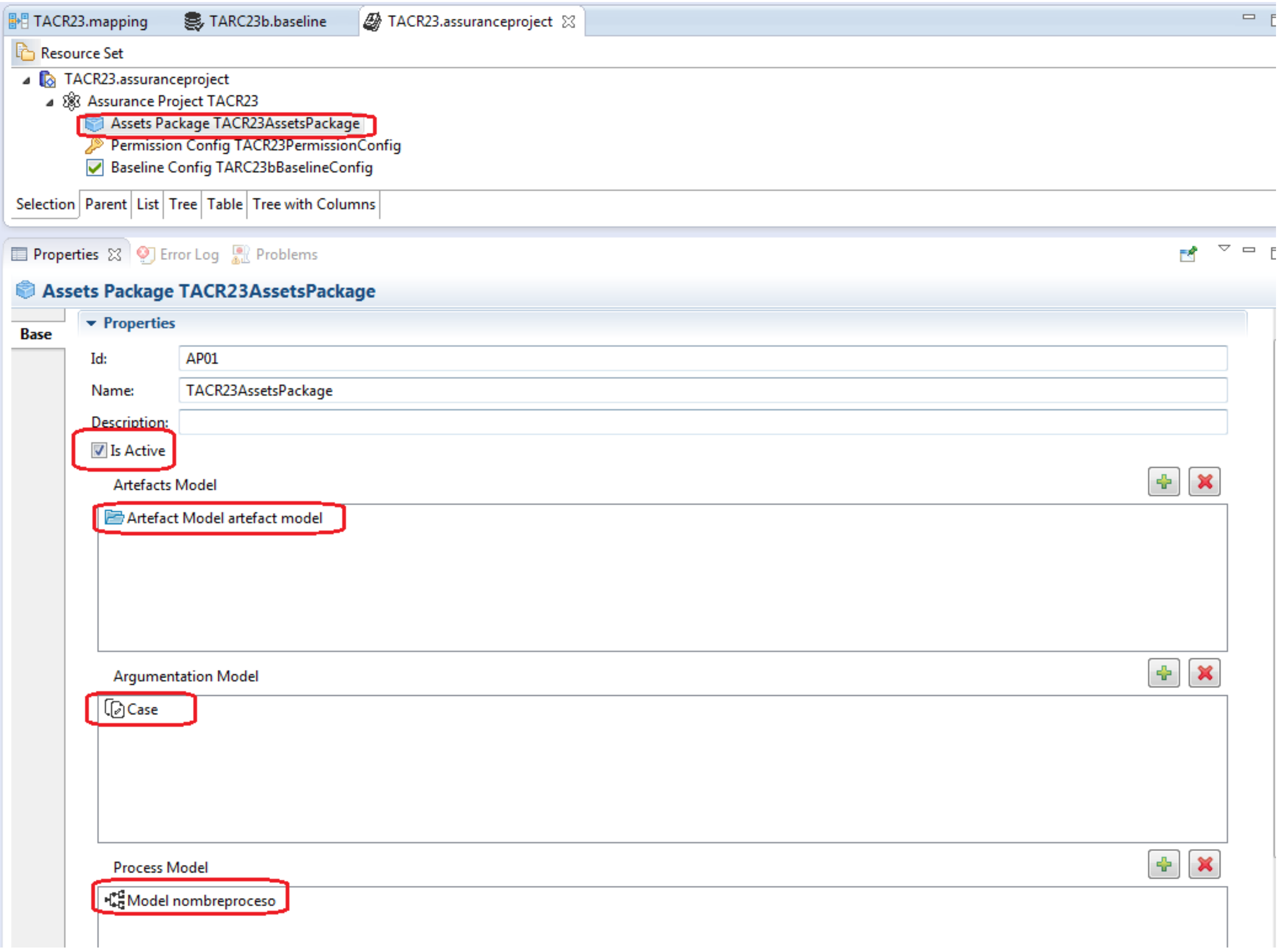
- One way using the editor,
- Another way using a tailored functionality for it.

5.4.1 Compliance Map using the editor

To create Compliance Maps using the editor, we must load four CDO resources: the artefact model (.evidence), process model (.process), argumentation model (.arg) and the mapping model (.mapping).

It is important remind that these models have to be part of the active BaselineConfig and AssetsPackage of the Assurance Project, in other words,

- The artefact model, process model and argumentation model have to be part of the active AssetsPackage of the project:



TACR23.mapping | TARC23b.baseline | TACR23.assuranceproject

Resource Set

- TACR23.assuranceproject
  - Assurance Project TACR23
    - Assets Package TACR23AssetsPackage
    - Permission Config TACR23PermissionConfig
    - Baseline Config TARC23bBaselineConfig

Assets Package TACR23AssetsPackage

Base

Properties

Id: AP01

Name: TACR23AssetsPackage

Description:

☑ Is Active

Artefacts Model

- Artefact Model artefact model

Argumentation Model

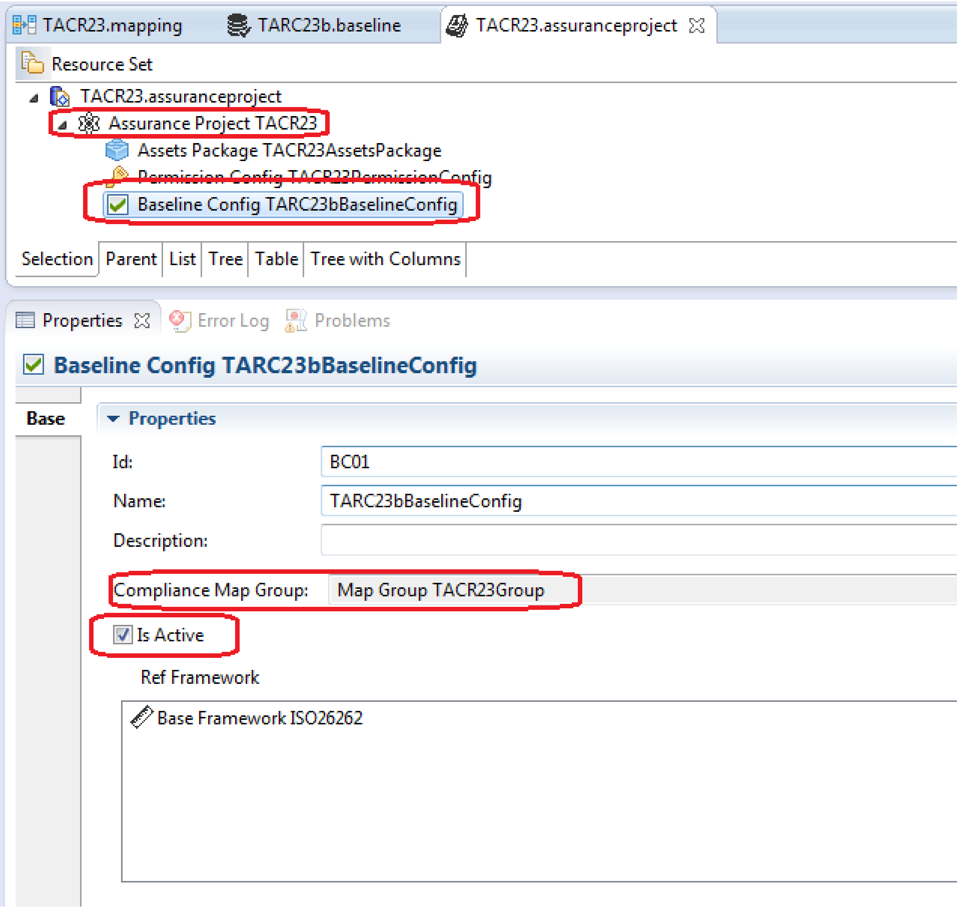
- Case

Process Model

- Model nombreproceso

Figure 52 - Assets Package active

- The map group of the mapping model has to be part of the active BaselineConfig of the project:



Id: BC01

Name: TARC23bBaselineConfig

Description:

Compliance Map Group: Map Group TACR23Group

☑ Is Active

Ref Framework

Base Framework ISO26262

Figure 53 - Baseline Config active

So, press the editing window and select “Load Resource” in the context menu.

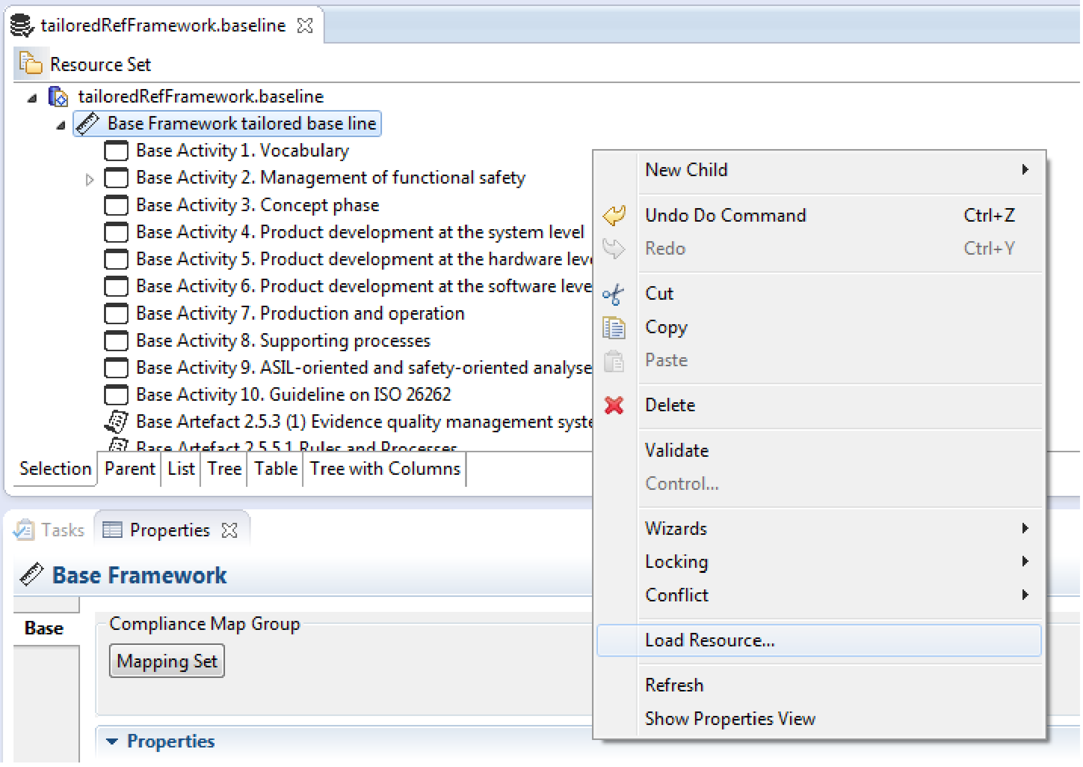
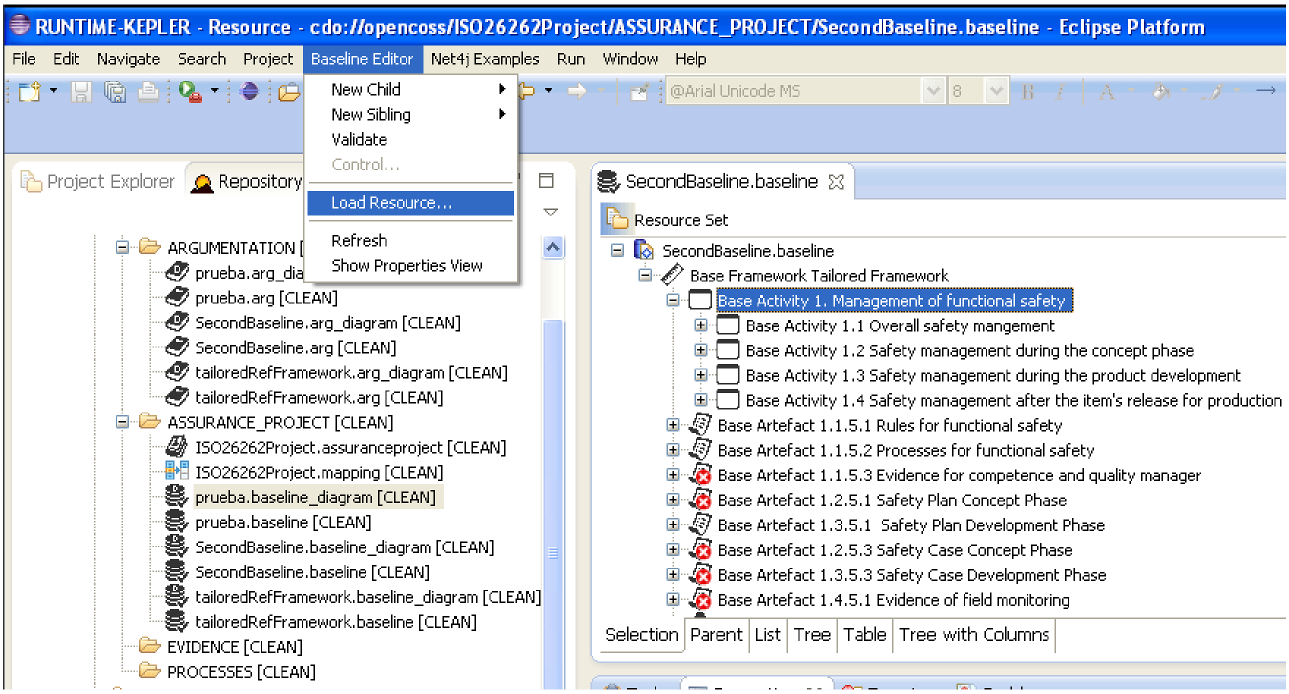

tailoredRefFramework.baseline
Resource Set
tailoredRefFramework.baseline
Base Framework tailored base line
Base Activity 1. Vocabulary
Base Activity 2. Management of functional safety
Base Activity 3. Concept phase
Base Activity 4. Product development at the system level
Base Activity 5. Product development at the hardware leve
Base Activity 6. Product development at the software leve
Base Activity 7. Production and operation
Base Activity 8. Supporting processes
Base Activity 9. ASIL-oriented and safety-oriented analyse
Base Activity 10. Guideline on ISO 26262
Base Artefact 2.5.3 (1) Evidence quality management syste
Base Artefact 2.5.5.1 Rules and Processes
Selection
Parent
List
Tree
Table
Tree with Columns
Tasks
Properties
Base Framework
Base
Compliance Map Group
Mapping Set
Properties
New Child
Undo Do Command Ctrl+Z
Redo Ctrl+Y
Cut
Copy
Paste
Delete
Validate
Control...
Wizards
Locking
Conflict
Load Resource...
Refresh
Show Properties View

Figure 54 - Load Resource

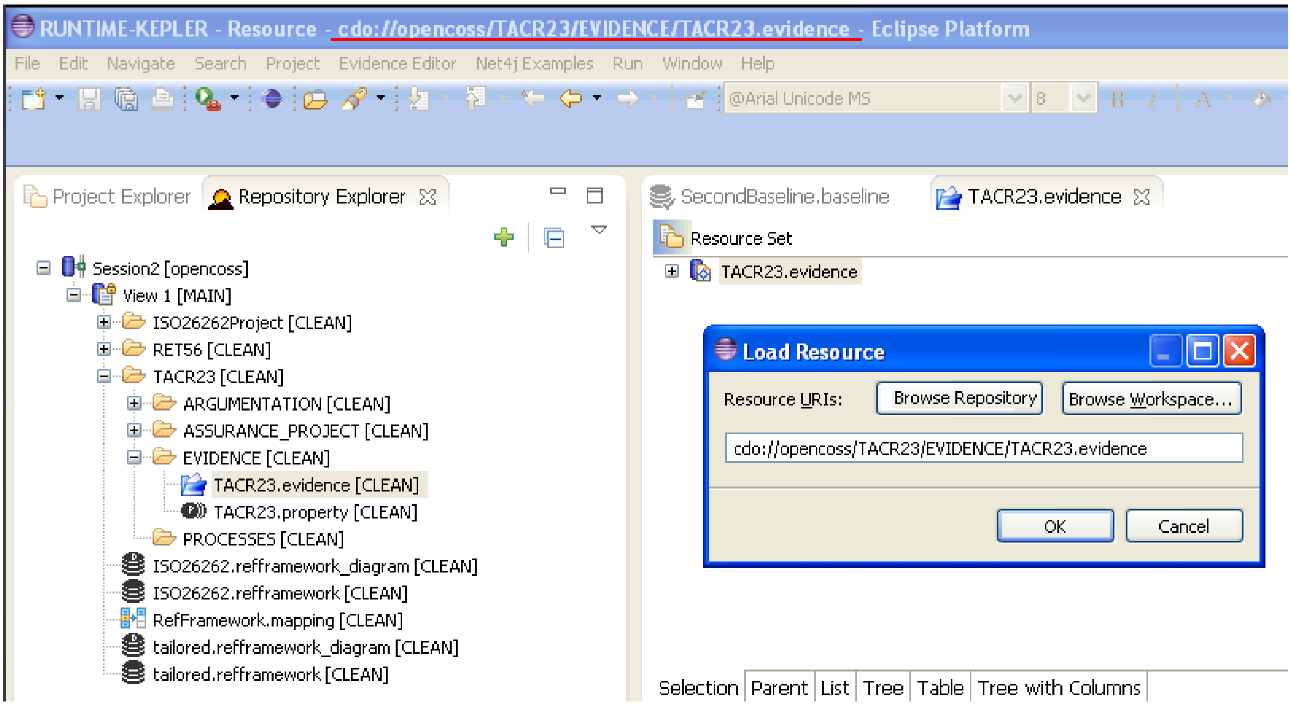
Other way is select the entry of the menu Baseline *Editor ->Load Resource*



RUNTIME-KEPLER - Resource - cdo://opencoss/ISO26262Project/ASSURANCE_PROJECT/SecondBaseline.baseline - Eclipse Platform
File Edit Navigate Search Project Baseline Editor Net4j Examples Run Window Help
New Child
New Sibling
Validate
Control...
Load Resource...
Refresh
Show Properties View
Project Explorer
Repository
SecondBaseline.baseline
Resource Set
SecondBaseline.baseline
Base Framework Tailored Framework
Base Activity 1. Management of functional safety
Base Activity 1.1 Overall safety mangement
Base Activity 1.2 Safety management during the concept phase
Base Activity 1.3 Safety management during the product development
Base Activity 1.4 Safety management after the item's release for production
Base Artefact 1.1.5.1 Rules for functional safety
Base Artefact 1.1.5.2 Processes for functional safety
Base Artefact 1.1.5.3 Evidence for competence and quality manager
Base Artefact 1.2.5.1 Safety Plan Concept Phase
Base Artefact 1.3.5.1 Safety Plan Development Phase
Base Artefact 1.2.5.3 Safety Case Concept Phase
Base Artefact 1.3.5.3 Safety Case Development Phase
Base Artefact 1.4.5.1 Evidence of field monitoring
Selection Parent List Tree Table Tree with Columns
ARGUMENTATION [
prueba.arg_dia
prueba.arg [CLEAN]
SecondBaseline.arg_diagram [CLEAN]
SecondBaseline.arg [CLEAN]
tailoredRefFramework.arg_diagram [CLEAN]
tailoredRefFramework.arg [CLEAN]
ASSURANCE_PROJECT [CLEAN]
ISO26262Project.assuranceproject [CLEAN]
ISO26262Project.mapping [CLEAN]
prueba.baseline_diagram [CLEAN]
prueba.baseline [CLEAN]
SecondBaseline.baseline_diagram [CLEAN]
SecondBaseline.baseline [CLEAN]
tailoredRefFramework.baseline_diagram [CLEAN]
tailoredRefFramework.baseline [CLEAN]
EVIDENCE [CLEAN]
PROCESSES [CLEAN]

Figure 55 - Load Resource II

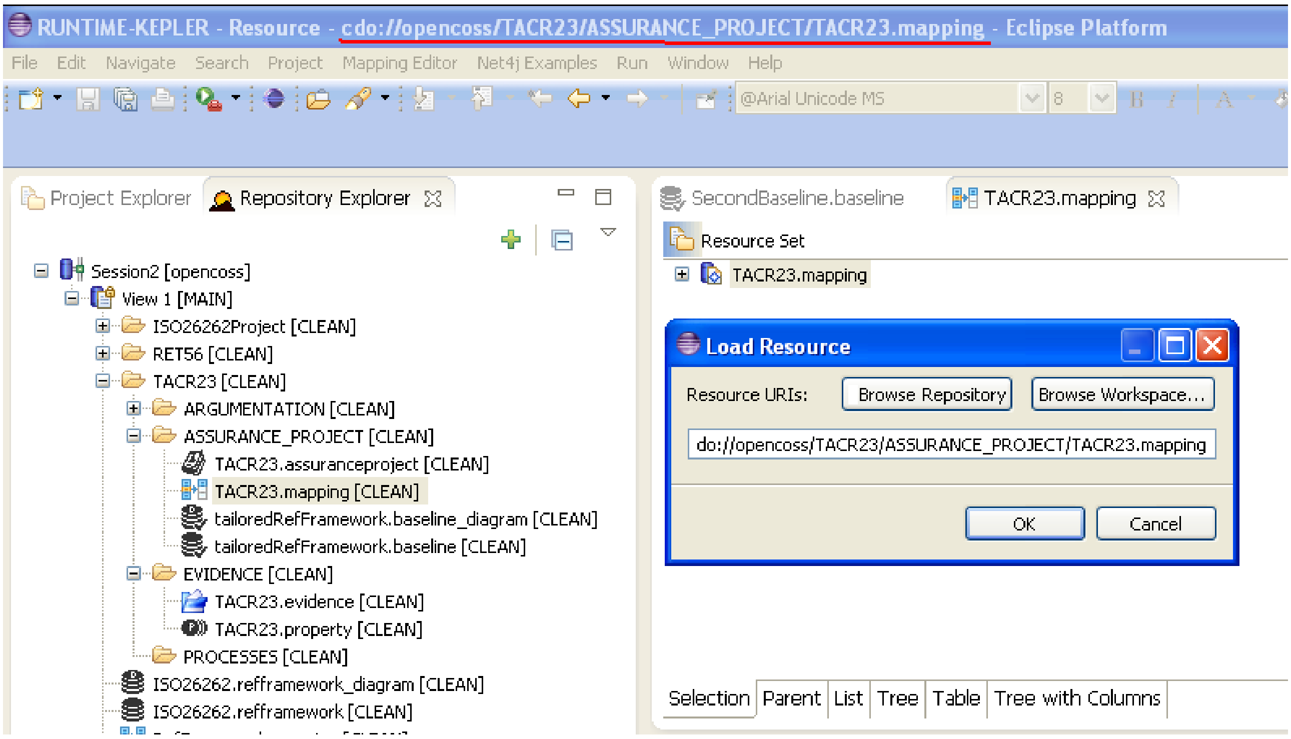
Then select the resource model browsing the repository using the “Browse Repository” button.



RUNTIME-KEPLER - Resource - cdo://opencoss/TACR23/EVIDENCE/TACR23.evidence - Eclipse Platform
File Edit Navigate Search Project Evidence Editor Net4j Examples Run Window Help
Project Explorer
Repository Explorer
Session2 [opencoss]
View 1 [MAIN]
ISO26262Project [CLEAN]
RET56 [CLEAN]
TACR23 [CLEAN]
ARGUMENTATION [CLEAN]
ASSURANCE_PROJECT [CLEAN]
EVIDENCE [CLEAN]
TACR23.evidence [CLEAN]
TACR23.property [CLEAN]
PROCESSES [CLEAN]
ISO26262.refframework_diagram [CLEAN]
ISO26262.refframework [CLEAN]
RefFramework.mapping [CLEAN]
tailored.refframework_diagram [CLEAN]
tailored.refframework [CLEAN]
SecondBaseline.baseline
TACR23.evidence
Resource Set
TACR23.evidence
Load Resource
Resource URIs:
Browse Repository
Browse Workspace...
OK
Cancel
Selection Parent List Tree Table Tree with Columns

Resource URIs: cdo://opencoss/TACR23/EVIDENCE/TACR23.evidence

Figure 56 - Load Resource Evidence, Process or Argumentation model



RUNTIME-KEPLER - Resource - cdo://opencoss/TACR23/ASSURANCE_PROJECT/TACR23.mapping - Eclipse Platform

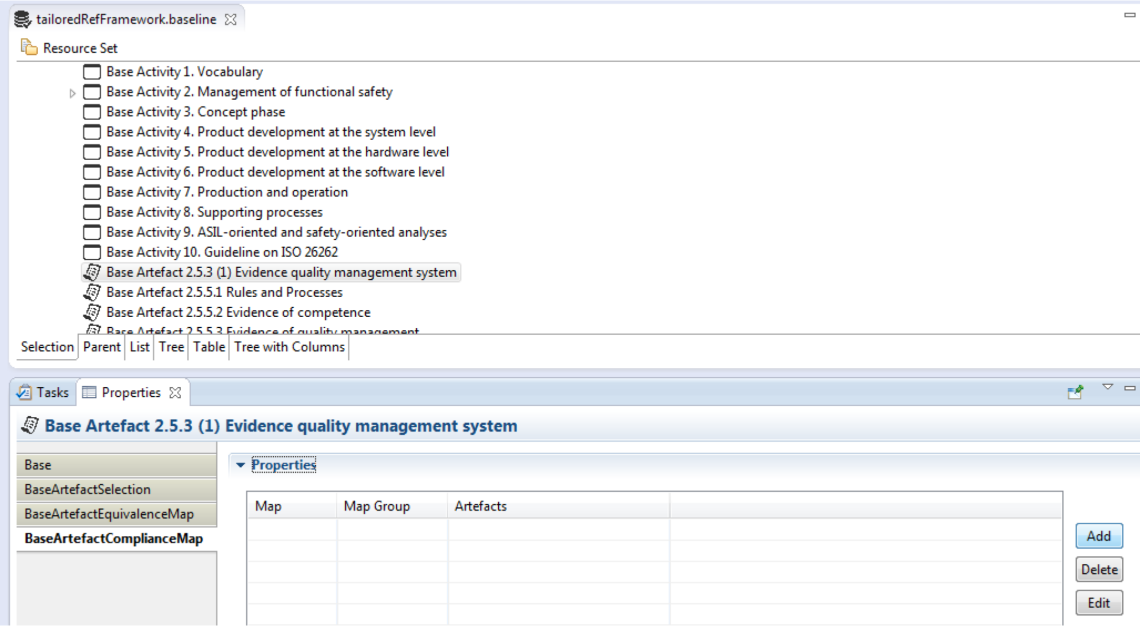
- Session2 [opencoss]
  - View 1 [MAIN]
    - ISO26262Project [CLEAN]
    - RET56 [CLEAN]
    - TACR23 [CLEAN]
      - ARGUMENTATION [CLEAN]
      - ASSURANCE_PROJECT [CLEAN]
        - TACR23.assuranceproject [CLEAN]
        - TACR23.mapping [CLEAN]
        - tailoredRefFramework.baseline_diagram [CLEAN]
        - tailoredRefFramework.baseline [CLEAN]
      - EVIDENCE [CLEAN]
        - TACR23.evidence [CLEAN]
        - TACR23.property [CLEAN]
      - PROCESSES [CLEAN]
    - ISO26262.refframework_diagram [CLEAN]
    - ISO26262.refframework [CLEAN]

Load Resource

Resource URIs: do://opencoss/TACR23/ASSURANCE_PROJECT/TACR23.mapping

Figure 57 - Load Resource Mapping model

It is possible to create compliance maps for activities, artefacts, requirements, roles and techniques. To do so, first select the object in the tree and after click on the tab “Compliance Map” and press the button “Add”



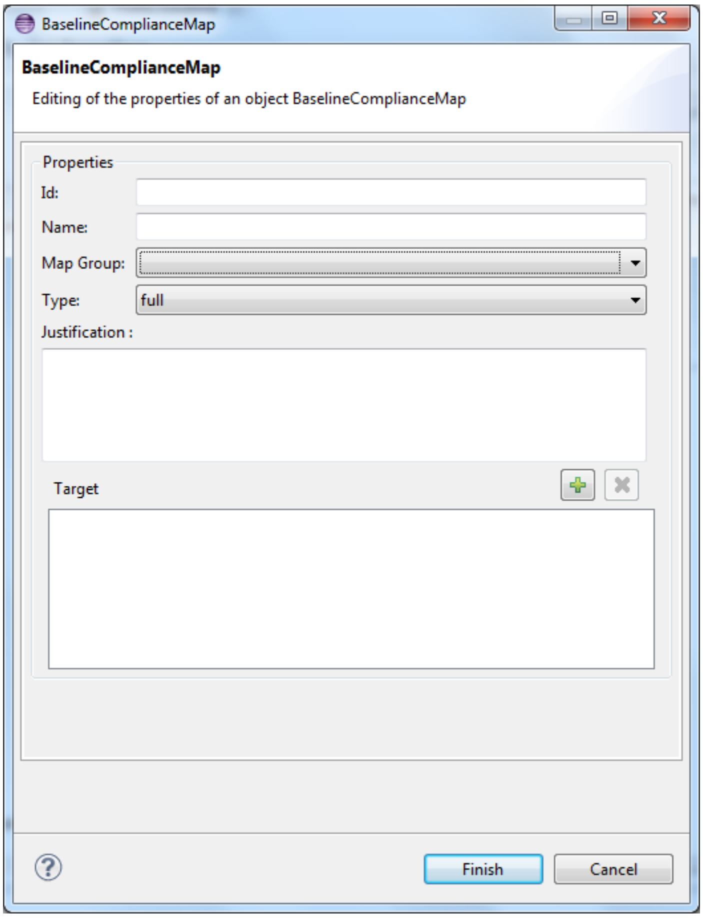
- Base Activity 1. Vocabulary
- Base Activity 2. Management of functional safety
- Base Activity 3. Concept phase
- Base Activity 4. Product development at the system level
- Base Activity 5. Product development at the hardware level
- Base Activity 6. Product development at the software level
- Base Activity 7. Production and operation
- Base Activity 8. Supporting processes
- Base Activity 9. ASIL-oriented and safety-oriented analyses
- Base Activity 10. Guideline on ISO 26262
- Base Artefact 2.5.3 (1) Evidence quality management system
- Base Artefact 2.5.5.1 Rules and Processes
- Base Artefact 2.5.5.2 Evidence of competence
- Base Artefact 2.5.5.3 Evidence of quality management

Base Artefact 2.5.3 (1) Evidence quality management system

Map	Map Group	Artefacts

Figure 58 - Artefact Compliance Map

Finally, enter the information requested:



BaselineComplianceMap

BaselineComplianceMap

Editing of the properties of an object BaselineComplianceMap

Properties

Id:

Name:

Map Group:

Type: full

Justification :

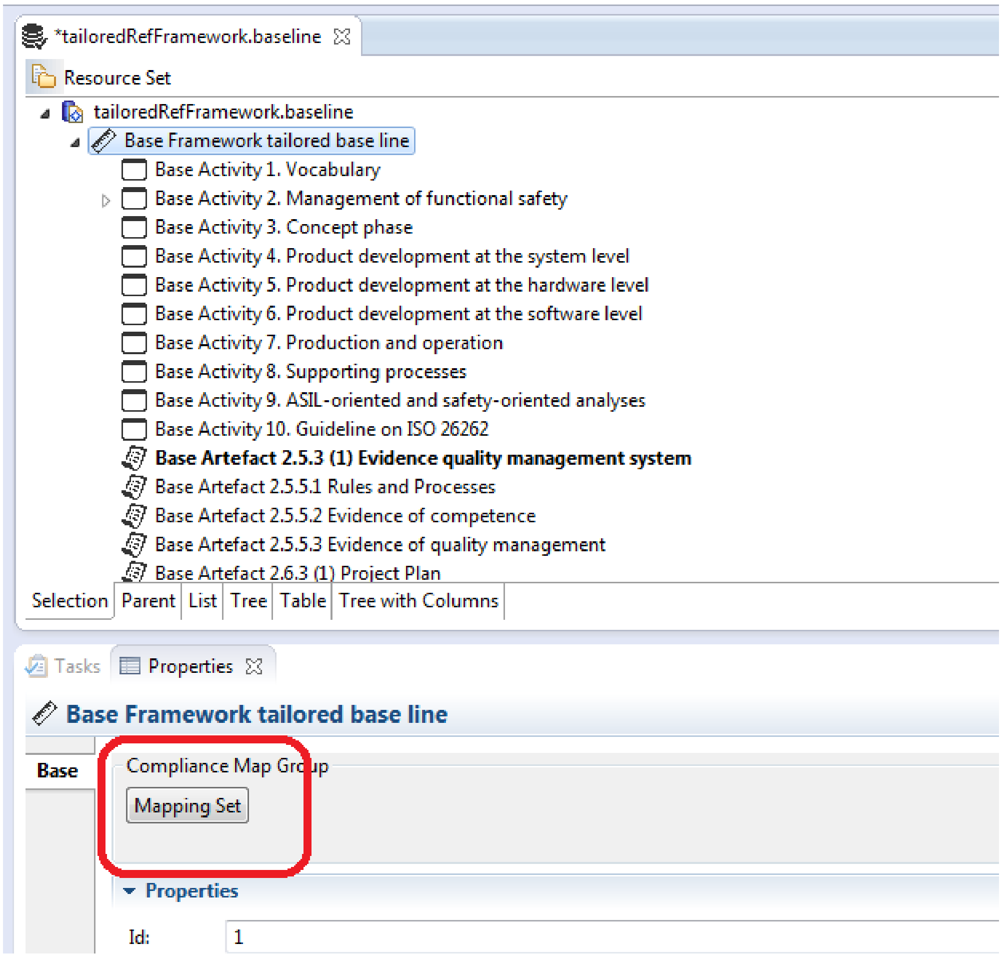
Target

Figure 59 - Compliance Map

Remember that the map group has to be part of the active Baseline Config of the project.

5.4.2 Compliance Map using a tailored functionality.

To create Compliance Maps using the tailored functionality, , first of all, it is necessary to press the button "Mapping Set" on the properties form of the baseline using the tree view editor (not available using the diagram editor). This window automatically saves the mappings when checking or unchecking elements of the target baseline tree.



*tailoredRefFramework.baseline

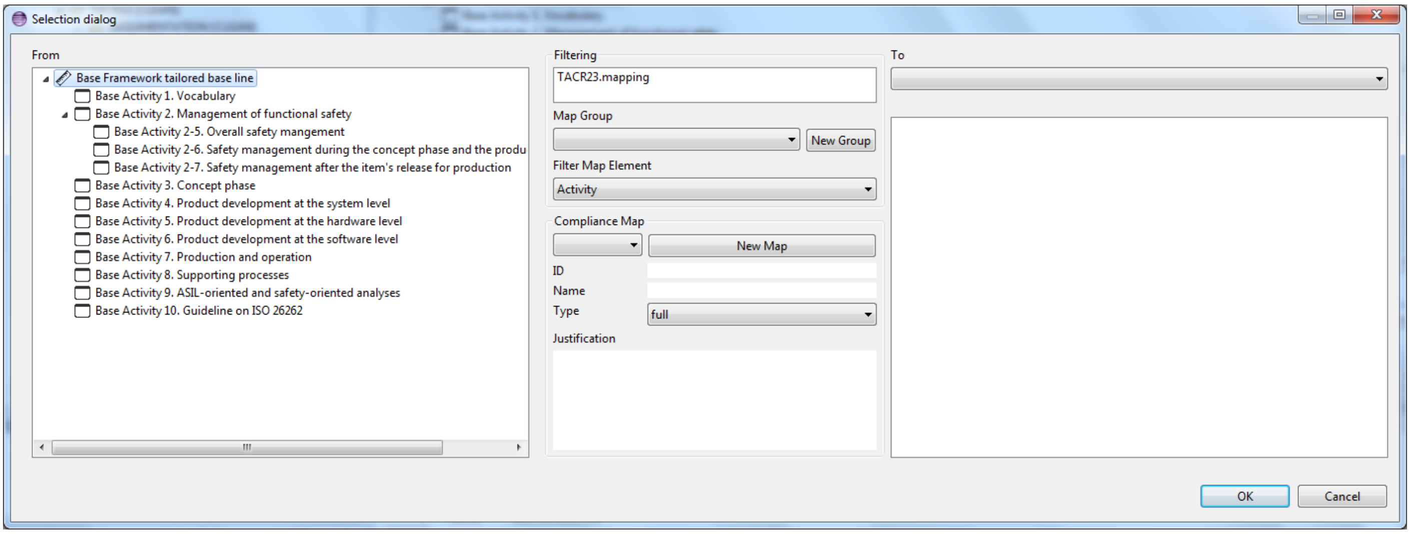
Resource Set

tailoredRefFramework.baseline
Base Framework tailored base line
Base Activity 1. Vocabulary
Base Activity 2. Management of functional safety
Base Activity 3. Concept phase
Base Activity 4. Product development at the system level
Base Activity 5. Product development at the hardware level
Base Activity 6. Product development at the software level
Base Activity 7. Production and operation
Base Activity 8. Supporting processes
Base Activity 9. ASIL-oriented and safety-oriented analyses
Base Activity 10. Guideline on ISO 26262
Base Artefact 2.5.3 (1) Evidence quality management system
Base Artefact 2.5.5.1 Rules and Processes
Base Artefact 2.5.5.2 Evidence of competence
Base Artefact 2.5.5.3 Evidence of quality management
Base Artefact 2.6.3 (1) Project Plan

Base Framework tailored base line

Id: 1

Figure 60 - How to create Compliance Map



Selection dialog

From

Base Framework tailored base line
Base Activity 1. Vocabulary
Base Activity 2. Management of functional safety
Base Activity 2-5. Overall safety mangement
Base Activity 2-6. Safety management during the concept phase and the produ
Base Activity 2-7. Safety management after the item's release for production
Base Activity 3. Concept phase
Base Activity 4. Product development at the system level
Base Activity 5. Product development at the hardware level
Base Activity 6. Product development at the software level
Base Activity 7. Production and operation
Base Activity 8. Supporting processes
Base Activity 9. ASIL-oriented and safety-oriented analyses
Base Activity 10. Guideline on ISO 26262

Filtering: TACR23.mapping

Map Group

Filter Map Element: Activity

Compliance Map

ID

Name

Type: full

Justification

To

Figure 61 - Compliance Map form

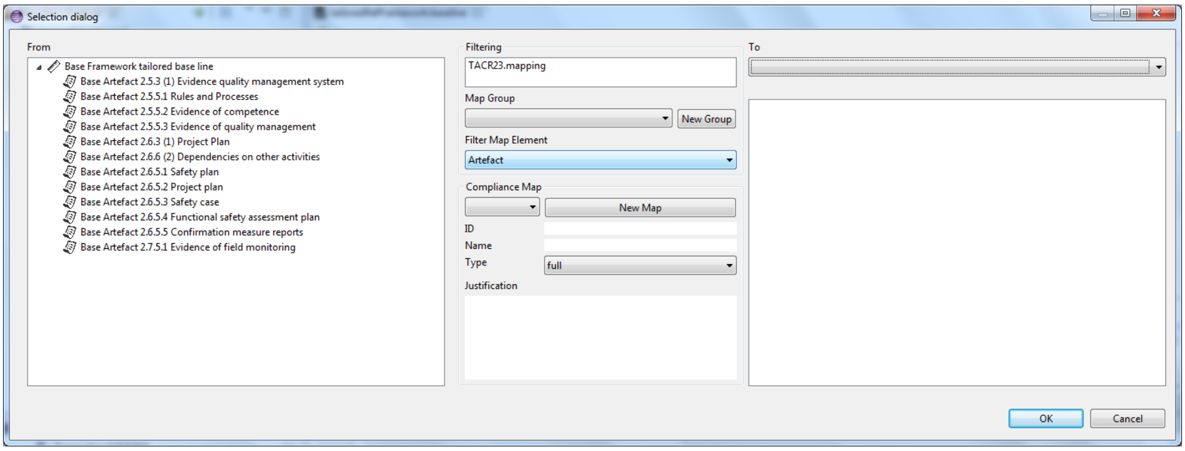
The Compliance Map form is organized in three zones:

- The *left zone* shows the actual baseline, and it loads the type of elements for which we want to make the compliance maps. For default, activities.
- The *middle zone* allows to make different filters like:
    - *Filter Mapping Model* lists all the mapping models stored in the database, and it will be necessary to select one of them and one group model. It's also possible to create a new

map group pressing the button “New group”. This map group has to be part of the active Baseline Config of the project.

- *Filter Map Element*. It’s possible to create compliance maps for activities, artefacts, requirements, roles and techniques, and the allowed maps are:
  - BaseArtefact -> Artefact
  - BaseRequirement -> Artefact , Claim or Activity
  - BaseActivity -> Activity
  - BaseRole -> Participant
  - BaseTechnique -> Technique

  When the filter changes, also it changes the information showed by the reference framework. For example:
  - If the filter “Artefact” is selected:



Base Framework tailored base line
- Base Artefact 2.5.3 (1) Evidence quality management system
- Base Artefact 2.5.5.1 Rules and Processes
- Base Artefact 2.5.5.2 Evidence of competence
- Base Artefact 2.5.5.3 Evidence of quality management
- Base Artefact 2.6.3 (1) Project Plan
- Base Artefact 2.6.6 (2) Dependencies on other activities
- Base Artefact 2.6.5.1 Safety plan
- Base Artefact 2.6.5.2 Project plan
- Base Artefact 2.6.5.3 Safety case
- Base Artefact 2.6.5.4 Functional safety assessment plan
- Base Artefact 2.6.5.5 Confirmation measure reports
- Base Artefact 2.7.5.1 Evidence of field monitoring

Filtering: TACR23.mapping
Filter Map Element: Artefact
Type: full

Figure 62 - Compliance Map, select map element

  Remember that these models have to be part of the active Assets Package of the project.
- *Filter Compliance Map*. This filter allows making different compliance maps for the same element.

- The *right zone* shows the list of models, depend on the map filter, stored in our database. We should select one of them. This selected model will be the target of the compliance map to create.

For making a compliance map, follow the next steps:

1. Select a mapping model and a map group.
2. Select the target reference framework.
3. Select the filter map element.
4. Select the element from the source reference framework.
5. Select o create the compliance map.
6. And for last, check or uncheck the element from the target model.

5.5 Cross-Domain reuse

The cross-domain window objective is reusing the evidences from one source assurance project of one domain in a target assurance project of other domain. It’s mandatory that the target assurance project is based in a refframework with equivalence maps with the refframework in which is based the source assurance project and, logically, the source project must have and evidence model.

To access this functionality open the target assurance project model and press the button “Cross Domain” on the properties form of the Assurance Project element of the model.

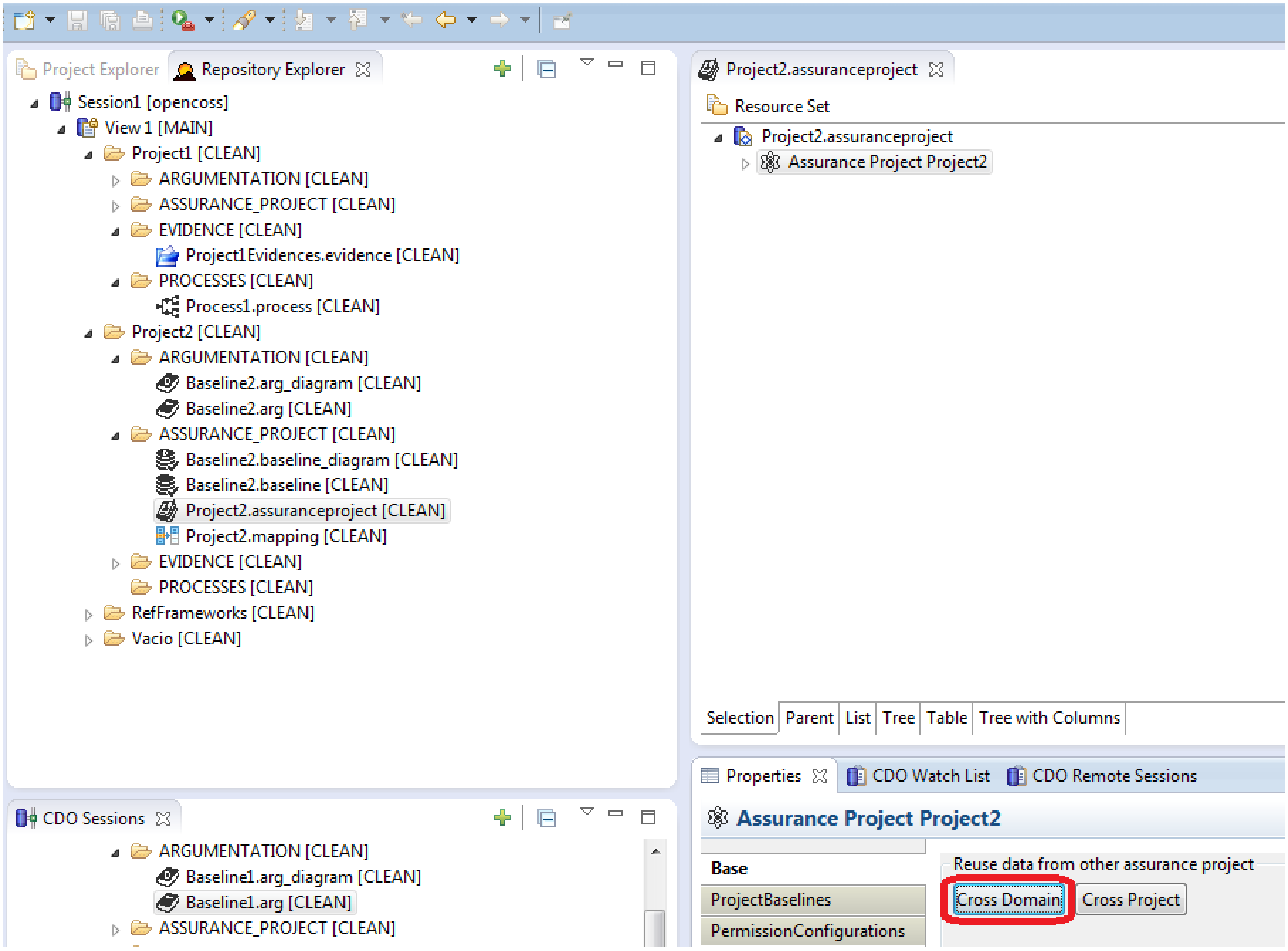
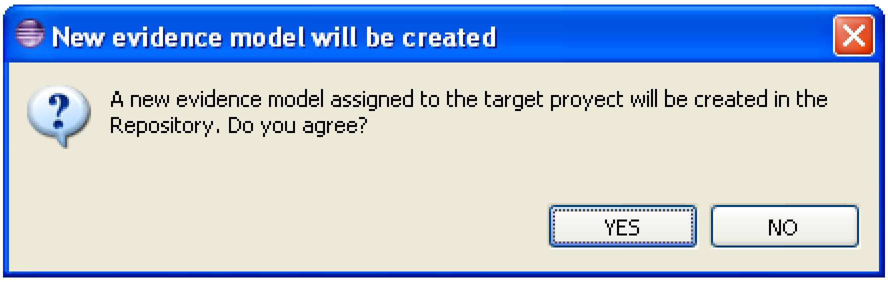


Figure 63 - Cross Domain button

If the target project doesn’t have an evidence model a confirmation message will be displayed asking the user confirmation to create it.

If the user is agree, a new evidence model will be generated automatically based in the contents of the target assurance project baseline (for each BaseArtefact in the target baseline, one Artefact Definition with one Artefact will be included in the target evidence model), the evidence model will be related with the target assurance project and also the compliance maps between the baseline and the evidences are automatically created. After this the data generation process, the cross domain window will be opened.

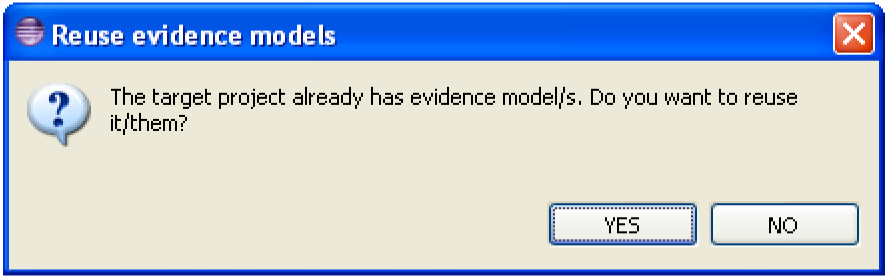
If the user refuses, the data is not created and the cross domain window is not opened because is mandatory to have and evidence model as destination model of the reuse.



A new evidence model assigned to the target proyect will be created in the Repository. Do you agree?

Figure 64 - Create a new evidence model message

If the target model already has an evidence model, the user is asked if he wants to use it as destination model of source Artefacts to reuse. If the user answers “Yes” the existing evidence model will be used as the target model of the reuse and the cross domain window will be opened. If the user says “No” the previously explained message will appear (see Figure above).



The target project already has evidence model/s. Do you want to reuse it/them?

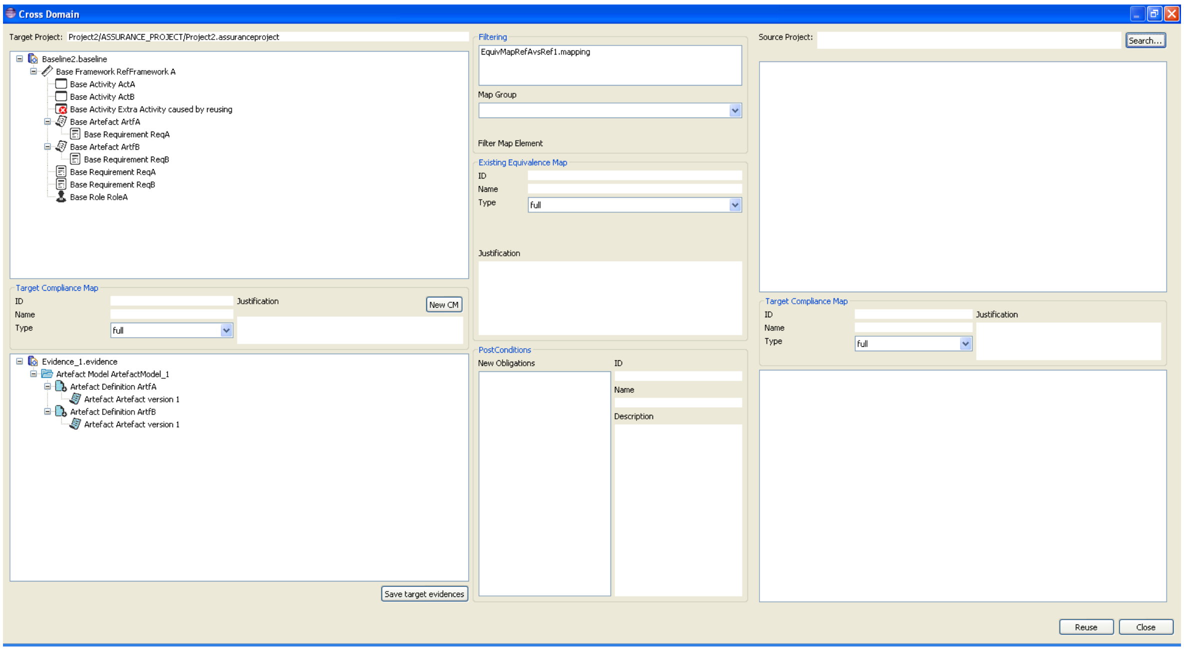
Figure 65 - Use existing evidence model message

The Cross Domain window is organized in three zones:

- The *left zone* shows information about the target project. In the top part the URL of the target assurance project, above a tree with the target baseline contents, above the compliance map information of the target baseline element selected and the contents of the target evidence model in other tree.
- The *middle zone* displays equivalence map information. It includes controls to select the equivalence mapping model and the equivalence map group, display the equivalence map details of the target baseline element selected and its postconditions in a list (to see the ID, Name and description one postcondition must be selected).
- The *right zone* presents information about the source project. In the top part the URL of the source assurance project, above a tree with the source baseline contents, above the compliance map information of the source baseline element selected and the contents of the source evidence model.

The user can obtain detailed information of any element displayed in the trees in a popup window by double-clicking over it. In the case of the target evidence model, the model can be edited directly in the popup window and the changes will be saved after clicking the “Save target evidences” button.

Also is possible to create new Compliance Maps between the target baseline and the target evidence model using the “New CM” button connected with the tailored Compliance map window explained in Section 5.4.2



Target Project: Project2/ASSURANCE_PROJECT/Project2.assuranceproject

Baseline2.baseline
- Base Framework RefFramework A
  - Base Activity ActA
  - Base Activity ActB
  - Base Activity Extra Activity caused by reusing
  - Base Artefact ArtfA
    - Base Requirement ReqA
  - Base Artefact ArtfB
    - Base Requirement ReqB
  - Base Requirement ReqA
  - Base Requirement ReqB
  - Base Role RoleA

Target Compliance Map: ID; Name; Type: full

Evidence_1.evidence
- Artefact Model ArtefactModel_1
  - Artefact Definition ArtfA
    - Artefact Artefact version 1
  - Artefact Definition ArtfB
    - Artefact Artefact version 1

Filtering: EquivMapRefAvsRef1.mapping

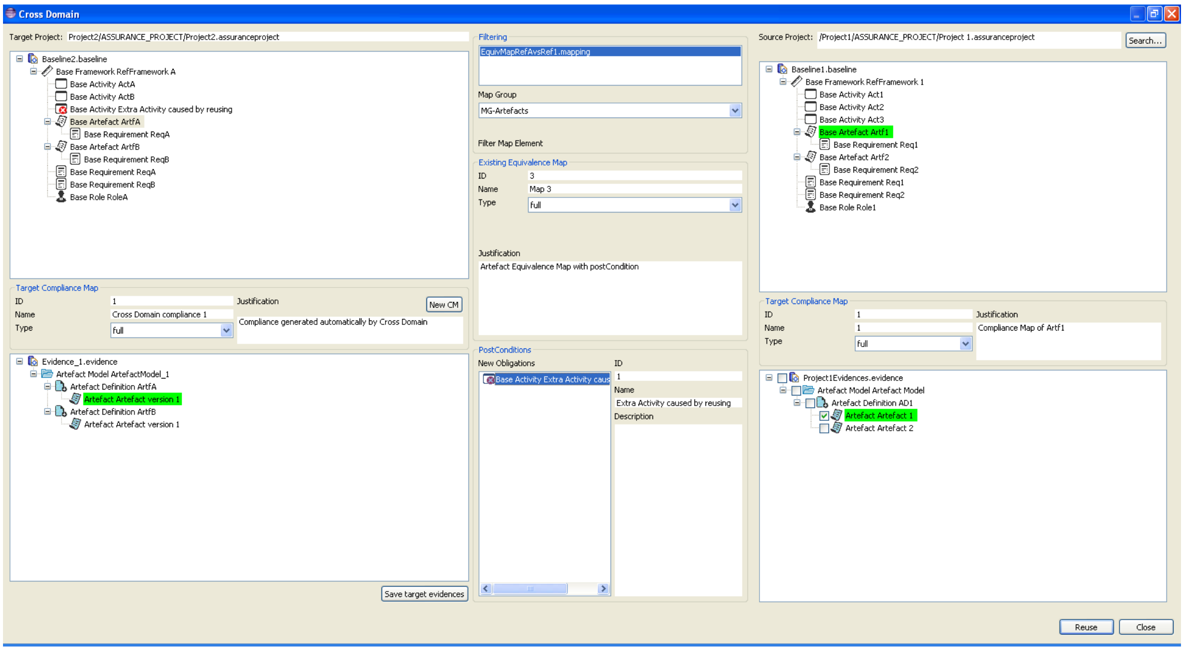
Existing Equivalence Map: ID; Name; Type: full

Source Project:

Target Compliance Map: ID; Name; Type: full

Figure 66 - Cross domain window

The user has to choose the source project of the reuse using the “Search button” and the source baseline and evidence model tree will be loaded. After this, has to select the equivalence model and the equivalence group. The next step is to select the target base element that will receive the evidences to be reused and its compliance and equivalence map information will be loaded, highlighting in green its target elements in the trees. Finally the user has to select the target Artefact and press the “Reuse” button to start the copy of the checked source Artefact/s to the target selected Artefact (only one can be selected).



Target Project: Project2/ASSURANCE_PROJECT/Project2.assuranceproject

Baseline2.baseline
- Base Framework RefFramework A
  - Base Activity ActA
  - Base Activity ActB
  - Base Activity Extra Activity caused by reusing
  - Base Artefact ArtfA
    - Base Requirement ReqA
  - Base Artefact ArtfB
    - Base Requirement ReqB
  - Base Requirement ReqA
  - Base Requirement ReqB
  - Base Role RoleA

Target Compliance Map: ID 1; Name Cross Domain compliance 1; Type full; Justification: Compliance generated automatically by Cross Domain

Evidence_1.evidence
- Artefact Model ArtefactModel_1
  - Artefact Definition ArtfA
    - Artefact Artefact version 1
  - Artefact Definition ArtfB
    - Artefact Artefact version 1

Filtering: EquivMapRefAvsRef1.mapping

Map Group: MG-Artefacts

Existing Equivalence Map: ID 3; Name Map 3; Type full

Justification: Artefact Equivalence Map with postCondition

PostConditions: New Obligations: Base Activity Extra Activity caus; ID 1; Name Extra Activity caused by reusing; Description

Source Project: /Project1/ASSURANCE_PROJECT/Project 1.assuranceproject

Baseline1.baseline
- Base Framework RefFramework 1
  - Base Activity Act1
  - Base Activity Act2
  - Base Activity Act3
  - Base Artefact Artf1
    - Base Requirement Req1
  - Base Artefact Artf2
    - Base Requirement Req2
  - Base Requirement Req1
  - Base Requirement Req2
  - Base Role Role1

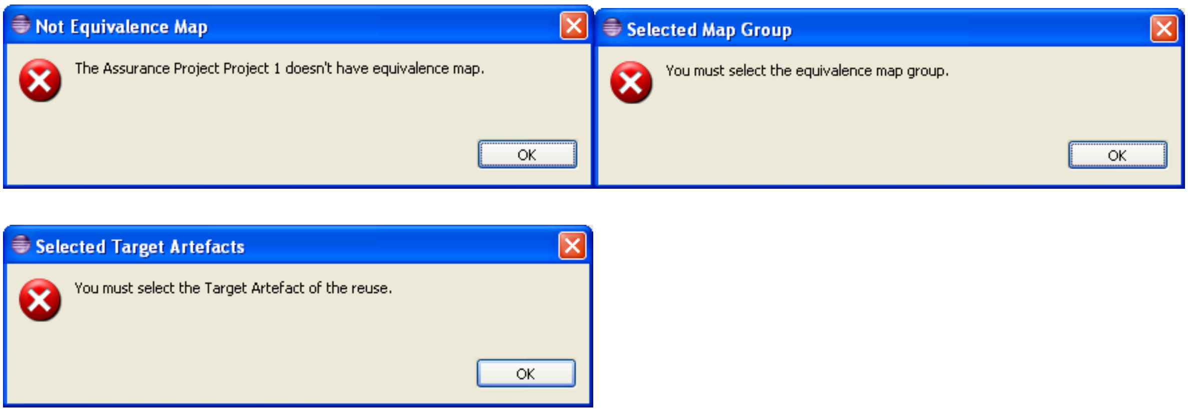
Target Compliance Map: ID 1; Name 1; Type full; Justification: Compliance Map of Artf1

- □ Project1Evidences.evidence
  - □ Artefact Model Artefact Model
    - □ Artefact Definition AD1
      - ☑ Artefact Artefact 1
      - □ Artefact Artefact 2

Figure 67 - Cross domain window with base element selected

As example the screenshot above shows that the selected BaseArtefact “ArtfA” of the target project “Project2” has a Compliance Map with the target Artefact “Artefact version 1” of the evidence model of the target project. Also has an equivalence map, inside the map group “MG-Artefacts”, with the source baseline BaseArtefact “Artf1” of the source assurance project “Project1” and as postcondition the BaseActivity “Extra Activity caused by reusing” (the equivalence maps are created at refframework level and are copied to the baselines during the assurance project generation process). The source BaseArtefact “Artf1” has a Compliance Map with the target Artefact “Artefact 1” of the evidence model of the source project. Therefore, the “Artefact 1” is a good candidate to be reused, according to the existing equivalence and compliance mapping information, and appears checked and highlighted in green.

This window checks the integrity of the data before start the copy process, for example:


Not Equivalence Map

The Assurance Project Project 1 doesn't have equivalence map.

Selected Map Group

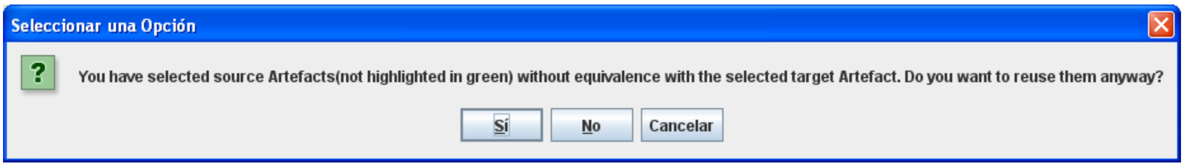
You must select the equivalence map group.

Selected Target Artefacts

You must select the Target Artefact of the reuse.

Figure 68 - Cross domain information messages about integrity

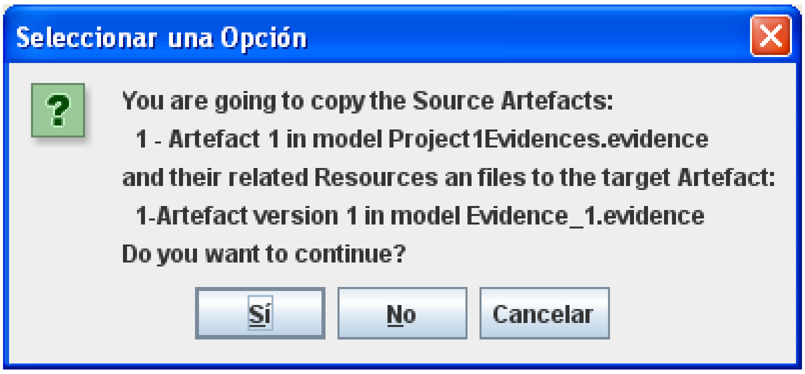
If the user wants to copy artefacts without equivalence between them, a confirmation message is showed.


Seleccionar una Opción

You have selected source Artefacts(not highlighted in green) without equivalence with the selected target Artefact. Do you want to reuse them anyway?

Figure 69 - Reuse not equivalence artefacts confirmation message

Finally, if all is correct another confirmation message with the resume of the data that will be copy is displayed.


Seleccionar una Opción

You are going to copy the Source Artefacts:
1 - Artefact 1 in model Project1Evidences.evidence
and their related Resources an files to the target Artefact:
1-Artefact version 1 in model Evidence_1.evidence
Do you want to continue?

Figure 70 - Cross domain final confirmation message

If the user continues the copy process will begin. The source repository configuration information inside the Artefact Model Object, the Resource objects of the checked source Artefacts and the repository files related to these resources will be copied to the target evidence model. Additionally, the postconditions will be selected in the target baseline model.

5.6 Cross-Project reuse

The cross-project window objective is reusing models from one source assurance project to a target assurance project, and also the diagrams will be copied to the target project if exists.

This window allows reusing only the selected source evidence models associated to the active Assets Package, because evidences are not related to any other model of the project, or all the baselines associated to the active Baseline Config and all the evidence, argumentation and process models of the active Assets Package. In this second option all the models will be cloned to assure the integrity of the data, for example, a baseline could be related with argumentations, evidences and/or processes and in this way we are sure all the related information is copied avoiding inconsistencies.

To access this functionality open the target assurance project model and press the button “Cross Project” on the properties form of the Assurance Project element of the model.

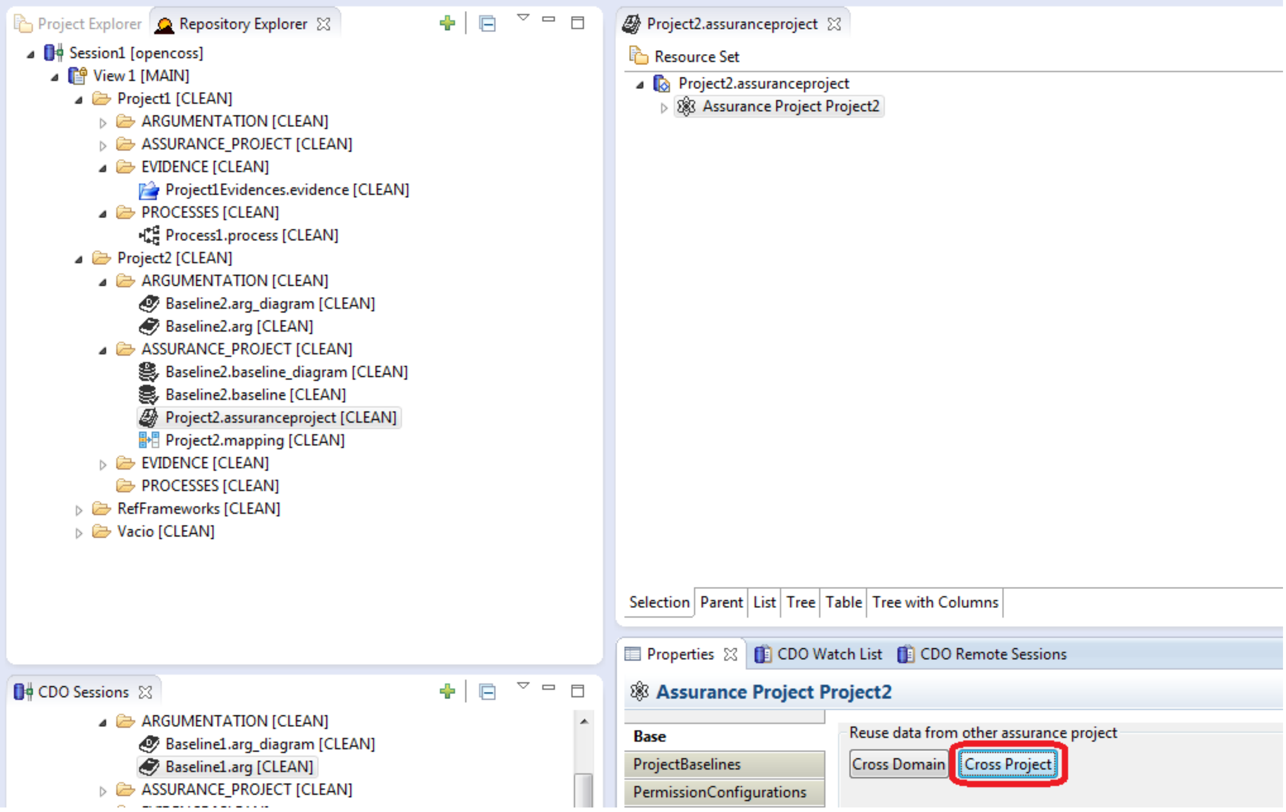
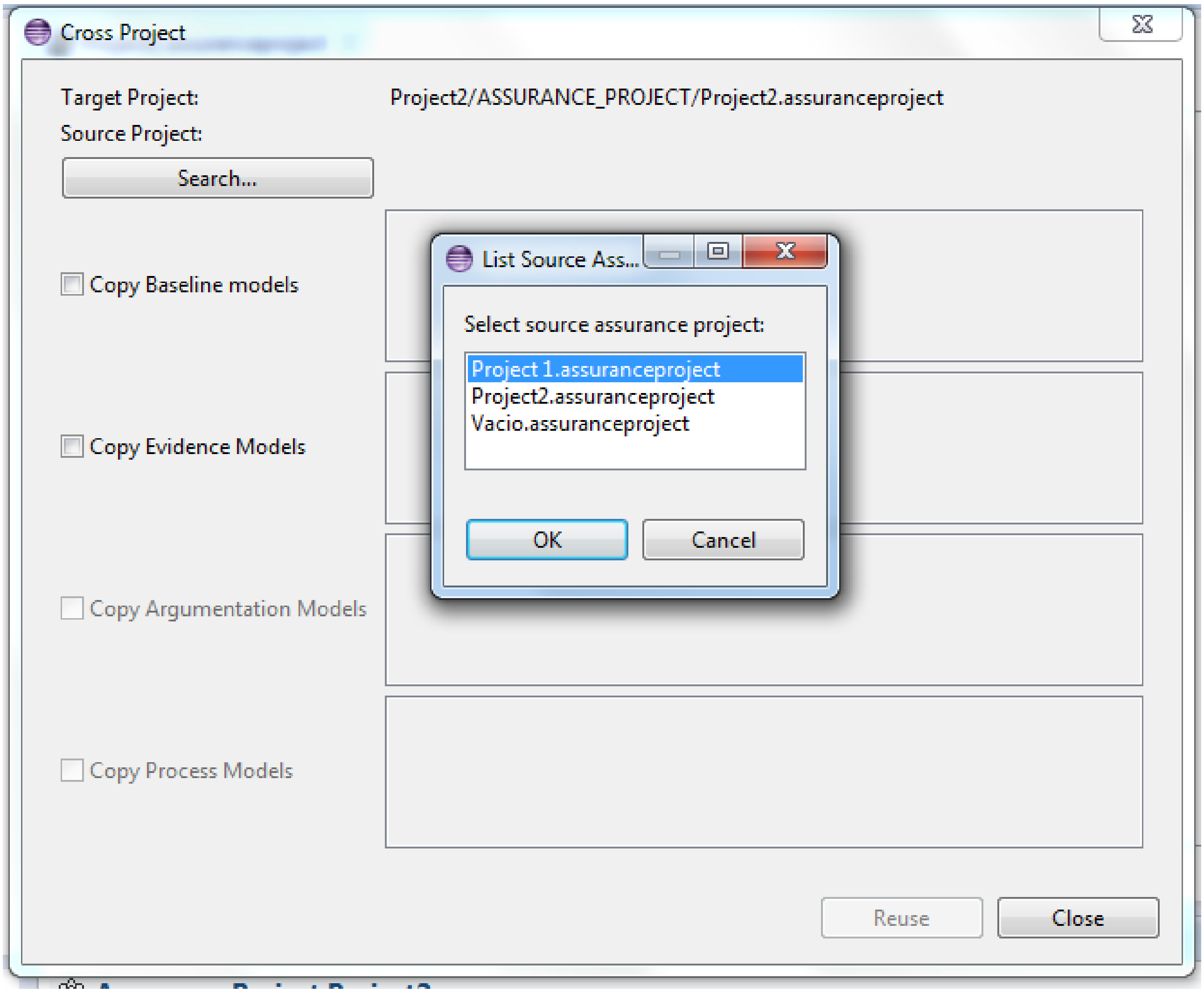


Figure 71 - Cross Project button

The user has to select the source project and after its models will be displayed in the window. As said before, only the models related to the active Baseline Config and active Assest Package of the source assurance project will appear.


Cross Project

Target Project: Project2/ASSURANCE_PROJECT/Project2.assuranceproject

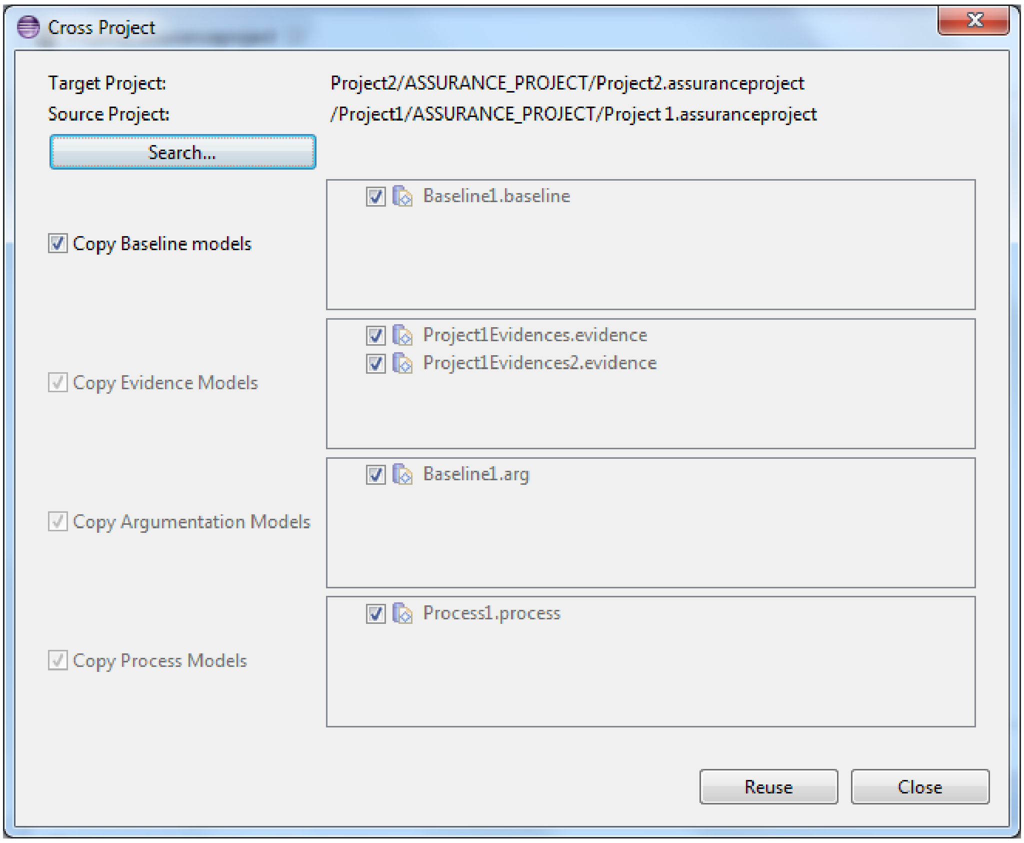
Source Project:

Select source assurance project:

Project 1.assuranceproject
Project2.assuranceproject
Vacio.assuranceproject

Figure 72 - Cross project: Source project selection

By default the “copy all models” option is selected but the user can uncheck the “copy baseline models” control to indicate that only wants to copy evidences. In this case, the user can select the desired models to copy from the evidence model list. To go back to the previous option only is necessary to check again the “copy baseline models” option.



Cross Project

Target Project: Project2/ASSURANCE_PROJECT/Project2.assuranceproject

Source Project: /Project1/ASSURANCE_PROJECT/Project 1.assuranceproject

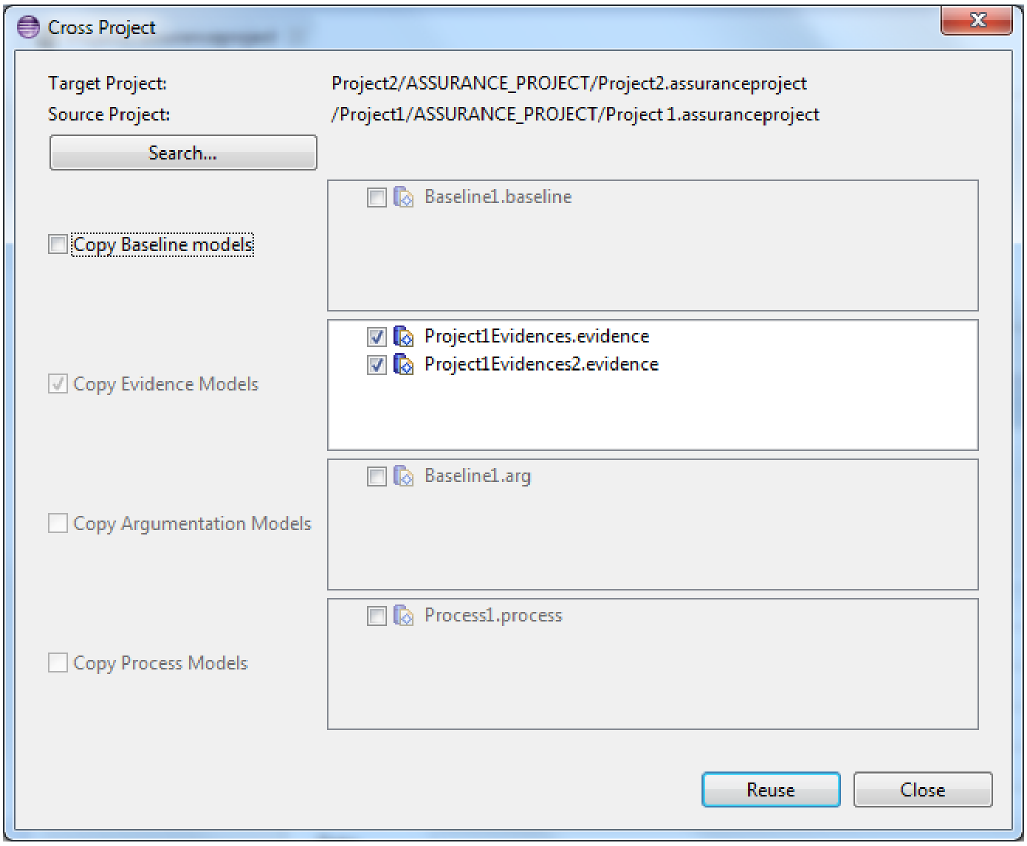
☑ Copy Baseline models — ☑ Baseline1.baseline

☑ Copy Evidence Models — ☑ Project1Evidences.evidence, ☑ Project1Evidences2.evidence

☑ Copy Argumentation Models — ☑ Baseline1.arg

☑ Copy Process Models — ☑ Process1.process

Figure 73 – Cross project: Copy all models



Cross Project

Target Project: Project2/ASSURANCE_PROJECT/Project2.assuranceproject

Source Project: /Project1/ASSURANCE_PROJECT/Project 1.assuranceproject

□ Copy Baseline models — □ Baseline1.baseline

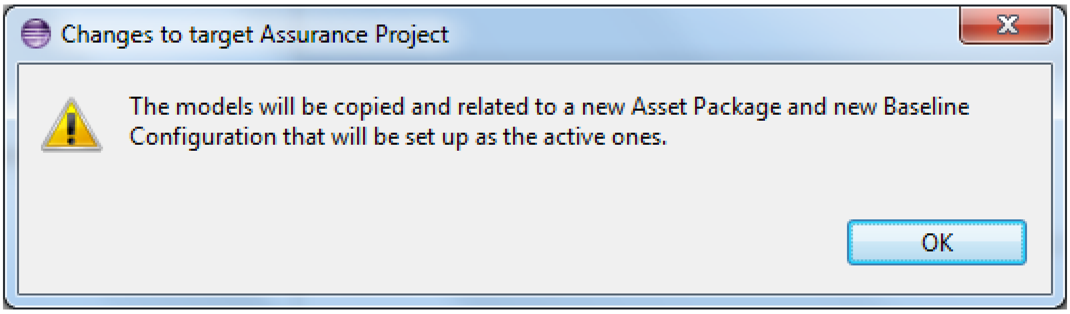
☑ Copy Evidence Models — ☑ Project1Evidences.evidence, ☑ Project1Evidences2.evidence

□ Copy Argumentation Models — □ Baseline1.arg

□ Copy Process Models — □ Process1.process

Figure 74 – Cross project: Copy only evidences

To begin the copy process the user must click over the Reuse button. In case of copying all the models, the information message in the screenshot below will be show to clarify to the user that the active Assets Package and Baseline Configuration of the target process will be changed. In case of reusing evidences, this message won't appear.

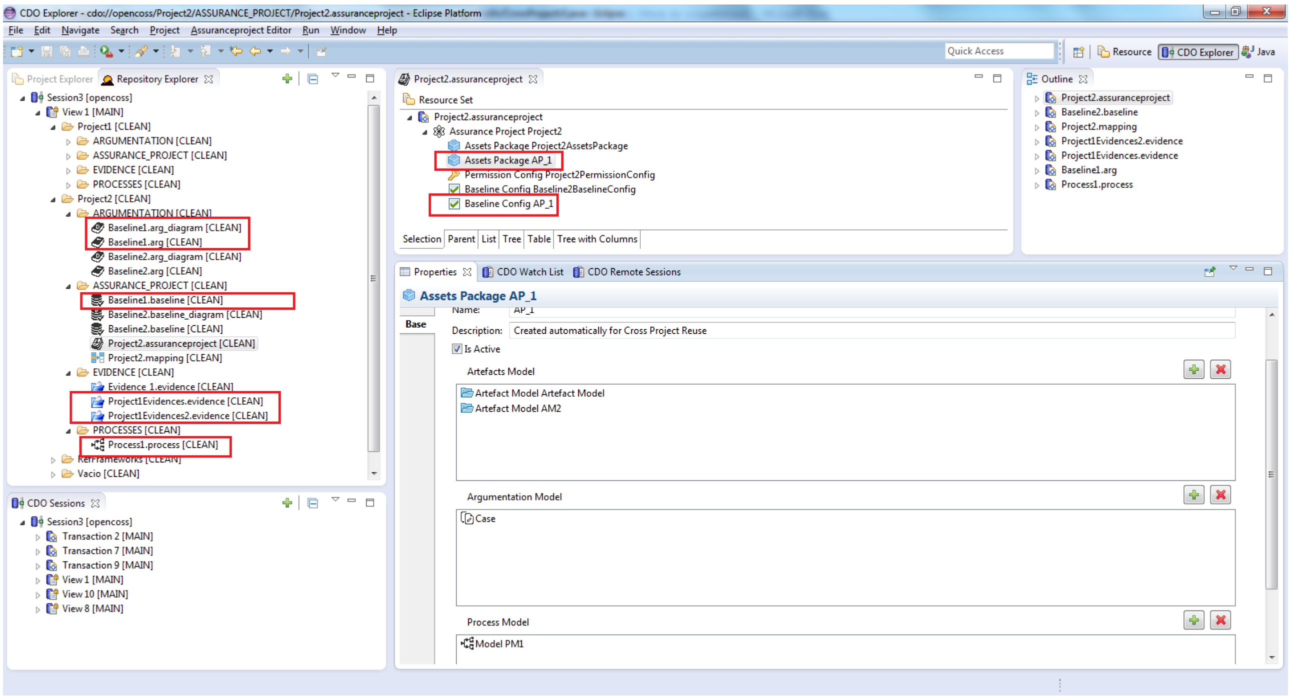


The models will be copied and related to a new Asset Package and new Baseline Configuration that will be set up as the active ones.

Figure 75 - Cross Project information message

When the copy process ends a message window will be shown.

In the next screenshot we can see, boxed in red, the new models copied and the new information added to the target assurance project model.


CDO Explorer - cdo://opencoss/Project2/ASSURANCE_PROJECT/Project2.assuranceproject - Eclipse Platform
File Edit Navigate Search Project Assuranceproject Editor Run Window Help
Quick Access
Resource
CDO Explorer
Java
Project Explorer
Repository Explorer
Session3 [opencoss]
View 1 [MAIN]
Project1 [CLEAN]
ARGUMENTATION [CLEAN]
ASSURANCE_PROJECT [CLEAN]
EVIDENCE [CLEAN]
PROCESSES [CLEAN]
Project2 [CLEAN]
ARGUMENTATION [CLEAN]
Baseline1.arg_diagram [CLEAN]
Baseline1.arg [CLEAN]
Baseline2.arg_diagram [CLEAN]
Baseline2.arg [CLEAN]
ASSURANCE_PROJECT [CLEAN]
Baseline1.baseline [CLEAN]
Baseline2.baseline_diagram [CLEAN]
Baseline2.baseline [CLEAN]
Project2.assuranceproject [CLEAN]
Project2.mapping [CLEAN]
EVIDENCE [CLEAN]
Evidence 1.evidence [CLEAN]
Project1Evidences.evidence [CLEAN]
Project1Evidences2.evidence [CLEAN]
PROCESSES [CLEAN]
Process1.process [CLEAN]
RefFrameworks [CLEAN]
Vacio [CLEAN]
CDO Sessions
Session3 [opencoss]
Transaction 2 [MAIN]
Transaction 7 [MAIN]
Transaction 9 [MAIN]
View 1 [MAIN]
View 10 [MAIN]
View 8 [MAIN]
Project2.assuranceproject
Resource Set
Project2.assuranceproject
Assurance Project Project2
Assets Package Project2AssetsPackage
Assets Package AP_1
Permission Config Project2PermissionConfig
Baseline Config Baseline2BaselineConfig
Baseline Config AP_1
Selection Parent List Tree Table Tree with Columns
Outline
Project2.assuranceproject
Baseline2.baseline
Project2.mapping
Project1Evidences2.evidence
Project1Evidences.evidence
Baseline1.arg
Process1.process
Properties
CDO Watch List
CDO Remote Sessions
Assets Package AP_1
Base
Artefacts Model
Artefact Model Artefact Model
Artefact Model AM2
Argumentation Model
Case
Process Model
Model PM1

Name: AP_1

Description: Created automatically for Cross Project Reuse

☑ Is Active

Figure 76 - Cross project reuse result

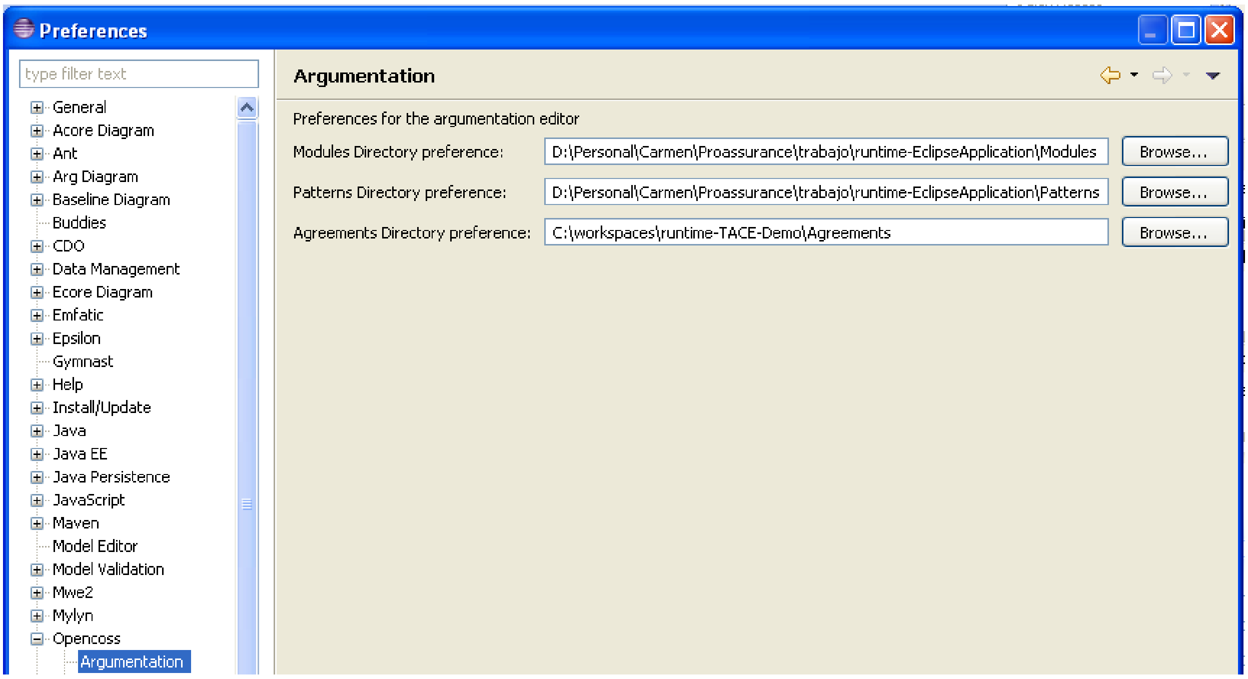
6 Safety Argumentation Management

6.1 Preferences

Set some configuration Parameters in Window→Preferences →Opencoss→Argumentation.
In the section, you can define parameters required by the Argumentation diagram editor.
The parameters which can be defined are below:

- Modules directory preference. This folder contains all argumentation modules stored from previous argumentation.
- Patterns directory preference. This folder contains all argumentation patterns templates.
- Agreements directory preference. This folder contains all agreements.

These folders are Eclipse Projects that should be created previously.



Argumentation

Preferences for the argumentation editor

Modules Directory preference: D:\Personal\Carmen\Proassurance\trabajo\runtime-EclipseApplication\Modules

Patterns Directory preference: D:\Personal\Carmen\Proassurance\trabajo\runtime-EclipseApplication\Patterns

Agreements Directory preference: C:\workspaces\runtime-TACE-Demo\Agreements

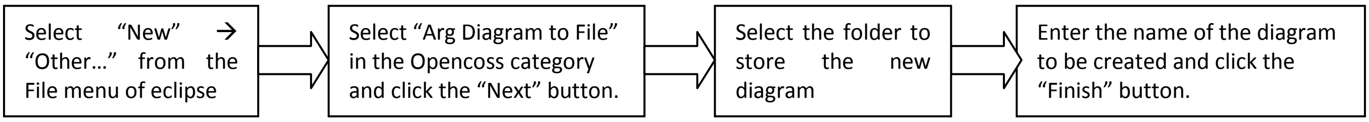
Figure 77 - Argumentation Preferences

6.2 Creating and Saving a Diagram

6.2.1 Creating a New Diagram

In File Format

To create a new file-based argumentation diagram, follow the procedure below and generate a new diagram in the project folder.

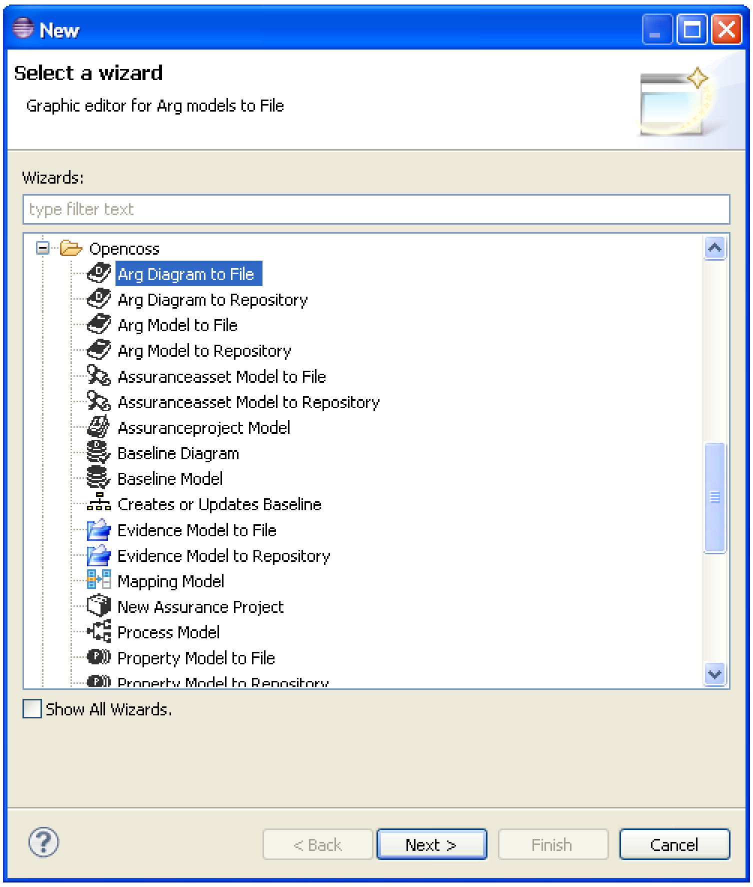


Select "New" → "Other…" from the File menu of eclipse

Select "Arg Diagram to File" in the Opencoss category and click the "Next" button.

Select the folder to store the new diagram

Enter the name of the diagram to be created and click the "Finish" button.



New

Select a wizard

Graphic editor for Arg models to File

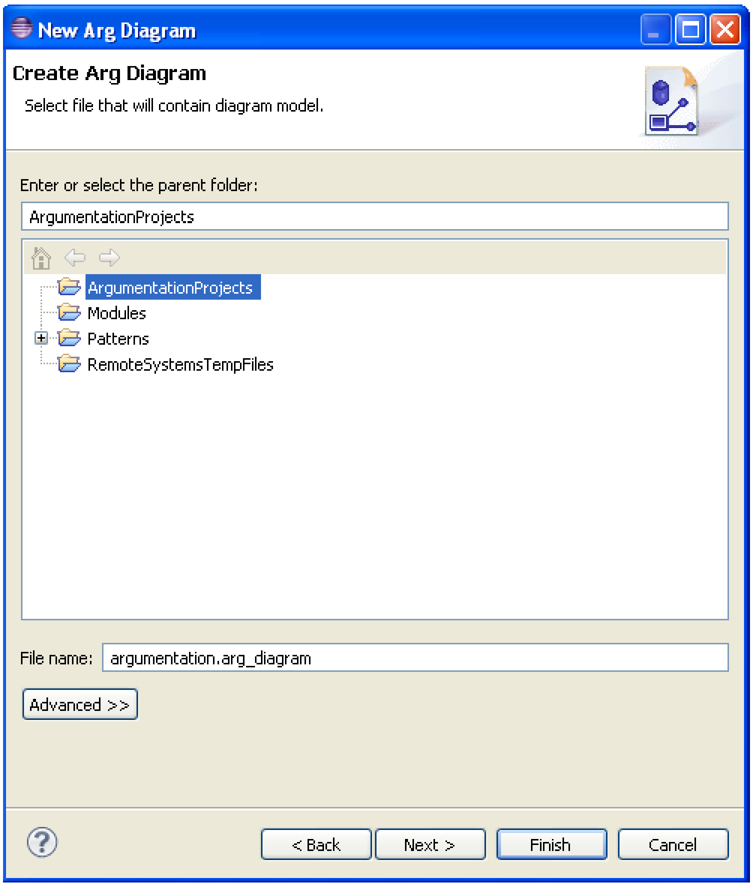
Wizards:

type filter text

- Opencoss
  - Arg Diagram to File
  - Arg Diagram to Repository
  - Arg Model to File
  - Arg Model to Repository
  - Assuranceasset Model to File
  - Assuranceasset Model to Repository
  - Assuranceproject Model
  - Baseline Diagram
  - Baseline Model
  - Creates or Updates Baseline
  - Evidence Model to File
  - Evidence Model to Repository
  - Mapping Model
  - New Assurance Project
  - Process Model
  - Property Model to File
  - Property Model to Repository

□ Show All Wizards.

Figure 78 - File-based Argumentation Diagram wizard I



New Arg Diagram

Create Arg Diagram

Select file that will contain diagram model.

Enter or select the parent folder:

ArgumentationProjects

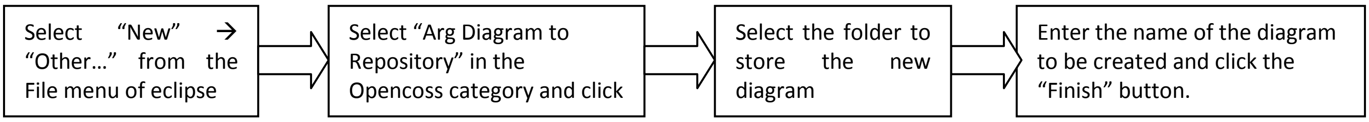
- ArgumentationProjects
- Modules
- Patterns
- RemoteSystemsTempFiles

File name: argumentation.arg_diagram

Figure 79 - File-based Argumentation Diagram wizard II

In Database Format

To create a new database-based argumentation diagram, follow the procedure below and generate a new diagram in the project folder.

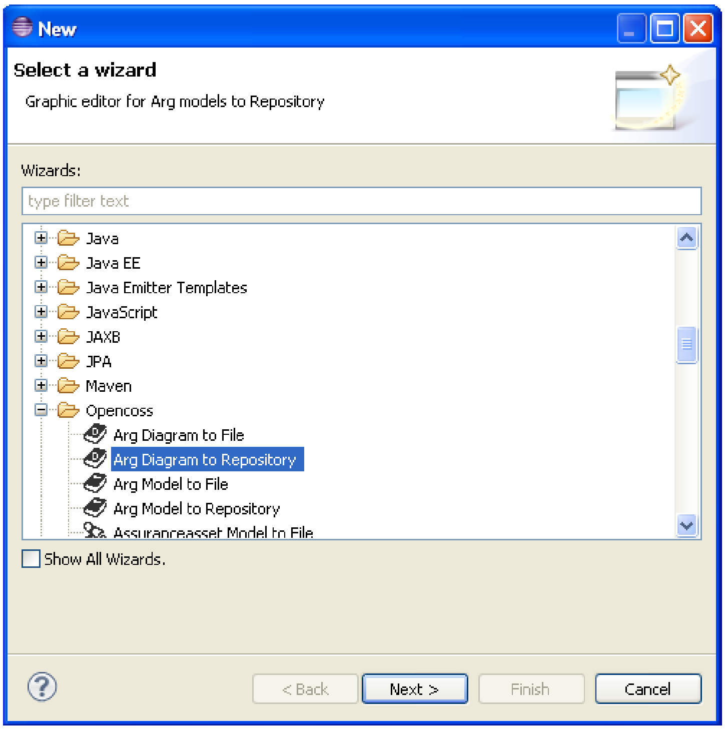


Select "New" → "Other…" from the File menu of eclipse

Select "Arg Diagram to Repository" in the Opencoss category and click

Select the folder to store the new diagram

Enter the name of the diagram to be created and click the "Finish" button.



New

Select a wizard

Graphic editor for Arg models to Repository

Wizards:

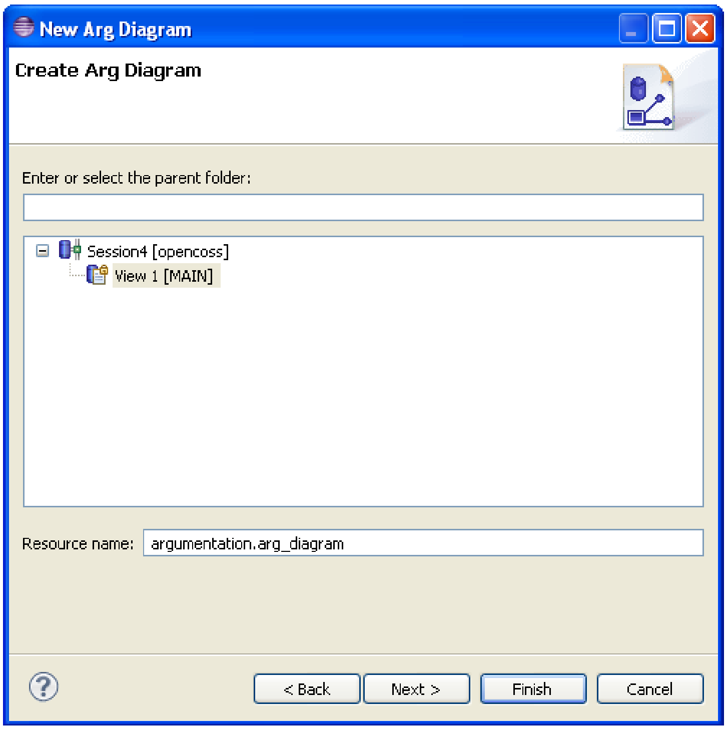
type filter text

- Java
- Java EE
- Java Emitter Templates
- JavaScript
- JAXB
- JPA
- Maven
- Opencoss
  - Arg Diagram to File
  - Arg Diagram to Repository
  - Arg Model to File
  - Arg Model to Repository
  - Assuranceasset Model to File

□ Show All Wizards.

< Back | Next > | Finish | Cancel

Figure 80 - Database-based Argumentation Diagram wizard I



New Arg Diagram

Create Arg Diagram

Enter or select the parent folder:

- Session4 [opencoss]
  - View 1 [MAIN]

Resource name: argumentation.arg_diagram

< Back | Next > | Finish | Cancel

Figure 81 - Database-based Argumentation Diagram wizard II

6.2.2 Creating a Diagram at the project creation time

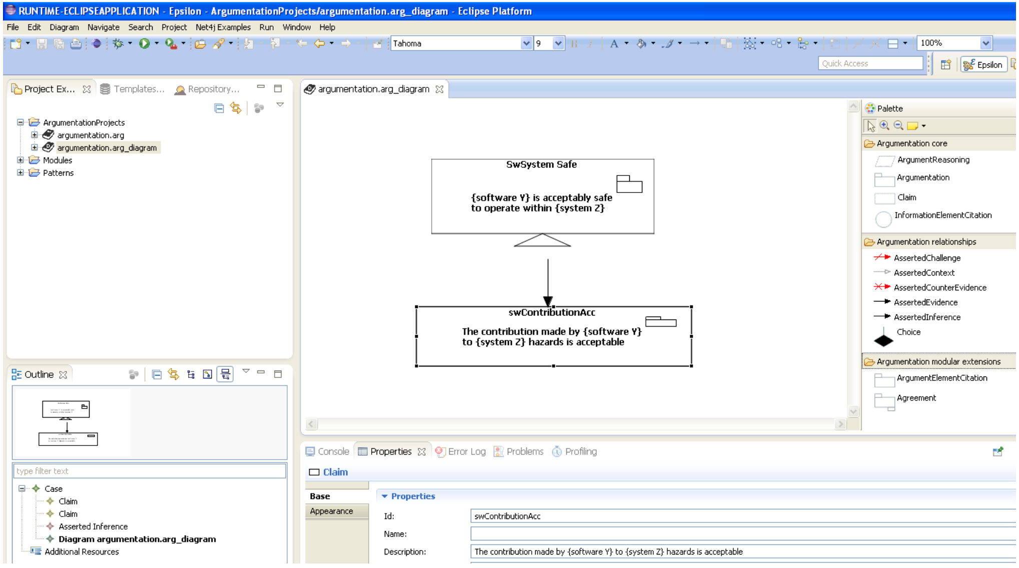
When we create a new assurance project (See section 5.1 Create an assurance project and a Baseline) a new argumentation is created. This argumentation is created applying a transformation to the baseline. The rules that apply to the transformation are the following:

- Every reference activity is transform into a claim. The id, name and description of the reference activity become also the id, name and description of the claim.
- Every reference requirement is transform into a claim. The id, name and description of the reference requirement become also the id, name and description of the claim.
- Every reference artefact is transform into an information element with the property type marked as solution. The id, name and description of the reference artefact become also the id, name and description of the information element.
- When a reference activity has sub activities, then an asserted inference relationship is created, the source is the claim transformed from the top activity and the target the claim transformed from the sub activity
- When a reference activity has reference requirements, then an asserted inference relationship is created, the source is the claim transformed from the reference activity and the target the claim transformed from the requirement

6.2.3 Opening a Diagram

In File Format

Double click on the project folder on the Package Explorer tab in order to expand the folder. The stored diagrams will be shown. Double click on Argumentation Diagram information file (.arg_diagram) to open a diagram in the editing window. The diagram can then be edited.

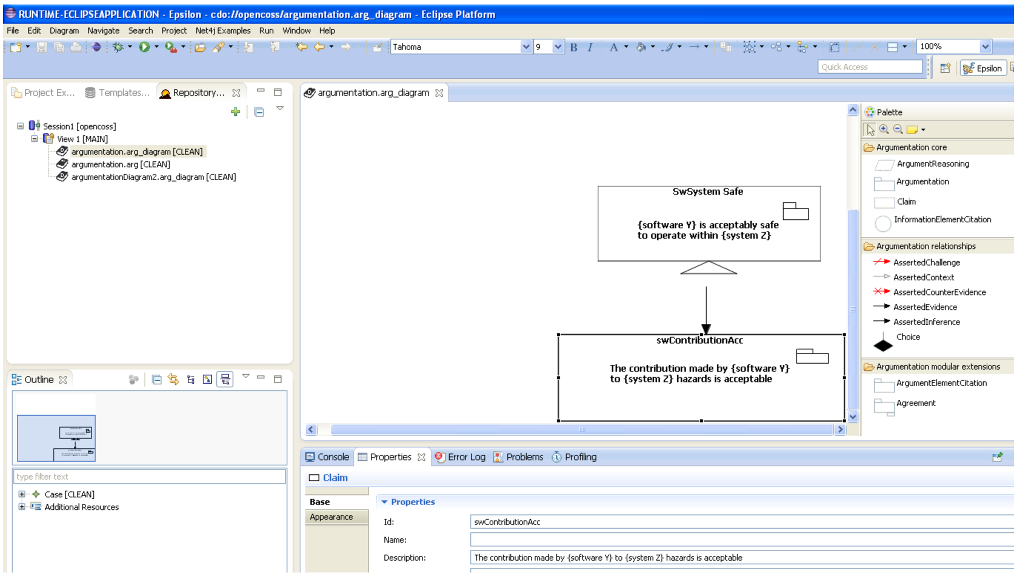


Id: swContributionAcc
Name:
Description: The contribution made by {software Y} to {system Z} hazards is acceptable

Figure 82 - Open File-based Argumentation Diagram

In Database Format

Double click on the project folder on the Repository Explorer tab in order to expand the folder. The stored diagrams will be shown. Double click on Argumentation Diagram information file (.arg_diagram) to open a diagram in the editing window. The diagram can then be edited.


RUNTIME-ECLIPSEAPPLICATION - Epsilon - cdo://opencoss/argumentation.arg_diagram - Eclipse Platform
File Edit Diagram Navigate Search Project Net4j Examples Run Window Help
Tahoma
9
100%
Quick Access
Epsilon
Project Ex...
Templates...
Repository...
Session1 [opencoss]
View 1 [MAIN]
argumentation.arg_diagram [CLEAN]
argumentation.arg [CLEAN]
argumentationDiagram2.arg_diagram [CLEAN]
Outline
type filter text
Case [CLEAN]
Additional Resources
argumentation.arg_diagram
SwSystem Safe
{software Y} is acceptably safe to operate within {system Z}
swContributionAcc
The contribution made by {software Y} to {system Z} hazards is acceptable
Palette
Argumentation core
ArgumentReasoning
Argumentation
Claim
InformationElementCitation
Argumentation relationships
AssertedChallenge
AssertedContext
AssertedCounterEvidence
AssertedEvidence
AssertedInference
Choice
Argumentation modular extensions
ArgumentElementCitation
Agreement
Console
Properties
Error Log
Problems
Profiling
Claim
Base
Appearance
Properties

Id: swContributionAcc

Name:

Description: The contribution made by {software Y} to {system Z} hazards is acceptable

Figure 83 - Open Database-based Argumentation Diagram

6.2.4 Saving a Diagram

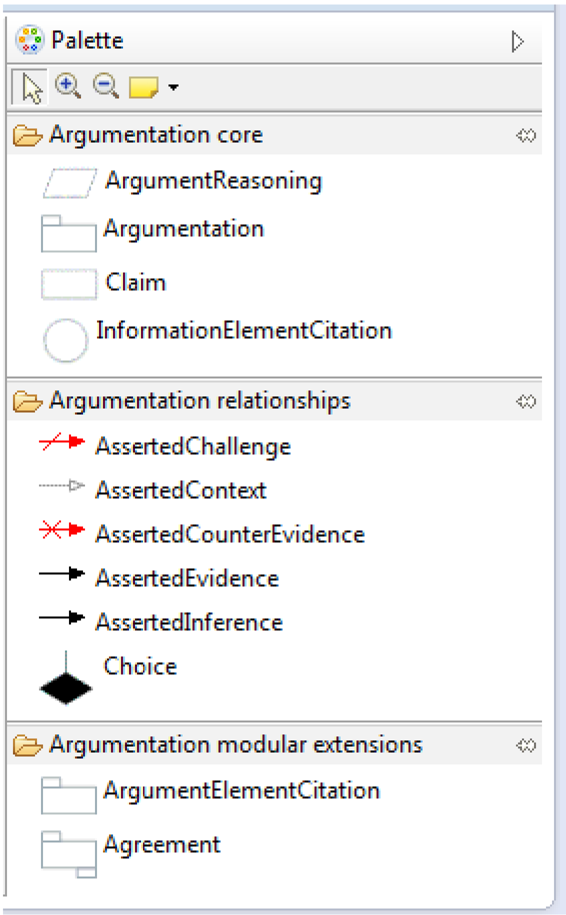
To save a diagram, select one of the following items in the “File” menu.

1. “Save” item
   This utility is only available for file-based Argumentation Diagram.
   The contents of the selected editing window will be saved in the model information file and the diagram information file.
2. “Save As...” item
   This utility is only available for file-based Argumentation Diagram.
   The contents of the selected editing window will be saved in the model information file and the diagram information file with a different name.
3. “Save All” item
   The contents of all editing windows will be saved in the corresponding model and the diagram information files/database.

6.3 Editing Functions

6.3.1 Editing a Diagram

Nodes and relationships (or links) selected from Palette can be added to the canvas. Just select the node from the Palette, go to the editing window and select the place and size of the element.



Palette

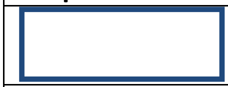
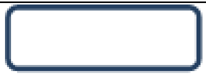
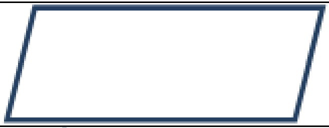
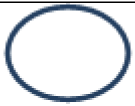
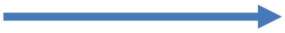
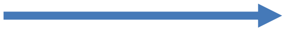
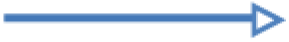
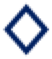
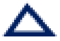
Argumentation core
- ArgumentReasoning
- Argumentation
- Claim
- InformationElementCitation

Argumentation relationships
- AssertedChallenge
- AssertedContext
- AssertedCounterEvidence
- AssertedEvidence
- AssertedInference
- Choice

Argumentation modular extensions
- ArgumentElementCitation
- Agreement

Figure 84 - Argumentation Palette

The palette is structure into three different sections. Section “Argumentation core” includes the main nodes for argumentation. These nodes implement the GSN graphical notation. The “Argumentation relationships” includes all the different links between the different nodes. “Argumentation modular extensions” includes those nodes specific for the modular argumentation.

Graphical notation	**GSN concept**	**Argumentation editor**
	Goal	Claim
	Context	InformationElementCitation Property type=”context”
	Strategy	ArgumentReasoning
	Solution	InformationElementCitation Property type=”solution”
	SolvedBy	AssertedInference, but only if the target is not a solution
	SolvedBy	AssertedEvidence, but only if the target is a solution
	InTheContextOf	Asserted
	Underdeveloped	Property toBeSupported=”true”
	To be instantiated	Property toBeInstantiated=”true”

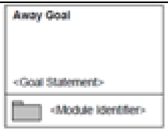
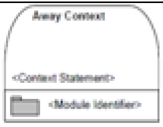
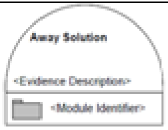
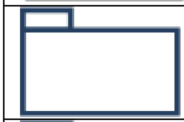
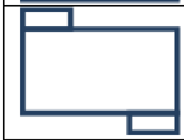
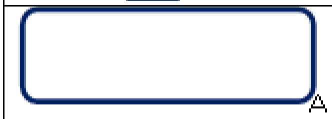
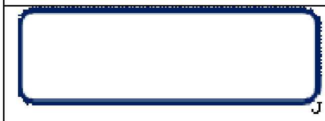
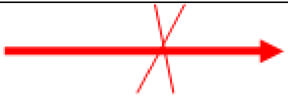
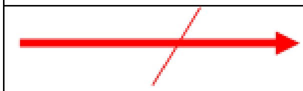
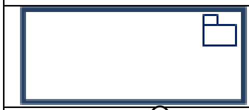
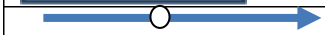
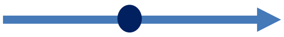
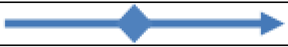
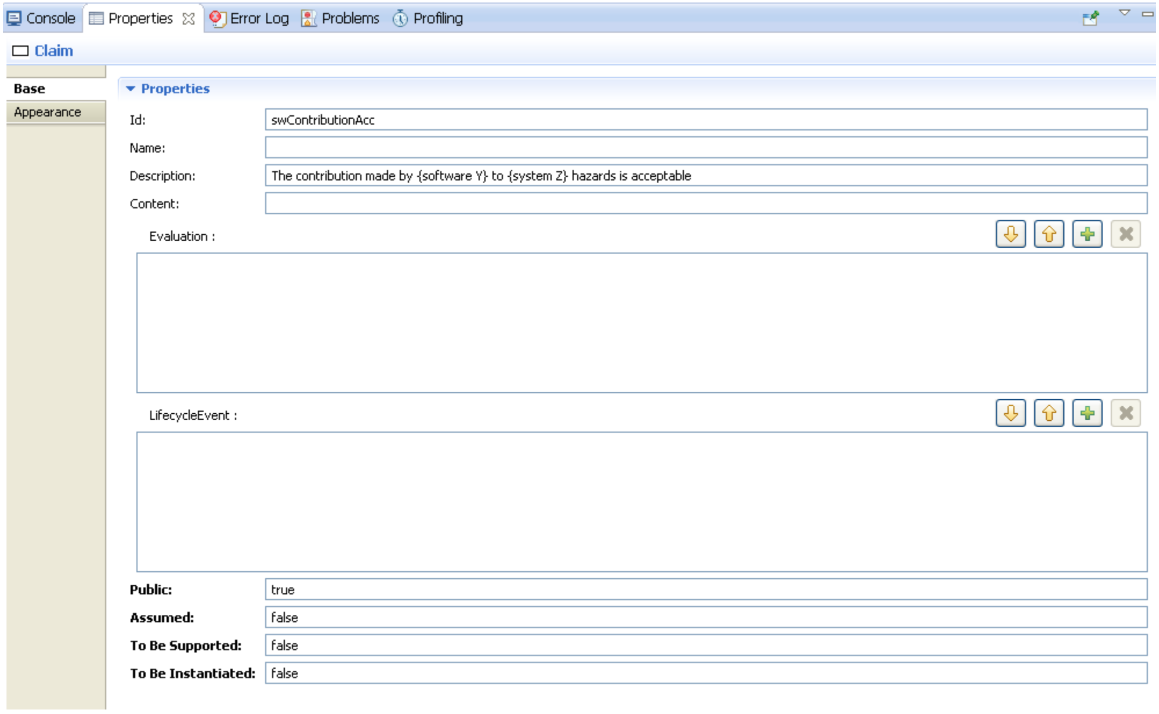
	AwayGoal	ArgumentElementCitation Property type="claim"
	AwayContext	ArgumentElementCitation Property type="context"
 Away Solution <Evidence Description> <Module Identifier>	AwaySolution	ArgumentElementCitation Property type="solution"
	Module	Argumentation
	Contract	Agreement
	Assumption	Claim Property assumed=true
	Justification	InformationElementCitation Property type="justification"
	N/A	AssertedCounterEvidence An AssertedCounterEvidence by Claim (A – the source evidence cited – and B – the target claim) denotes that the evidence cited by A is counter-evidence to the truth of Claim B (i.e., Evidence A suggests the conclusion that Claim B is false).
	N/A	AssertedChallenge An AssertedChallenge by Claim A (source) to Claim B (target) denotes that the truth of Claim A challenges the truth of Claim B (i.e., Claim A leads towards the conclusion that Claim B is false)
	Public Goal	Claim Property Public="true"
	Optionality	AssertedInference Property multiplicity=optional
	multiplicity	AssertedInference Property multiplicity=multi
	Choice	Choice

Table 2 - Argumentation graphical notation

In case of the links, just select the link from the palette, then on the editing window click on the source of the link and then release the click on the target of the link.

Popup menu opens when the mouse cursor is placed in the graphic-object editing area and is kept still for a moment. A node can be created by selecting the corresponding icon in the menu.
On the other hand, Properties View manages the properties of the current element under edition.



Id: swContributionAcc

Name:

Description: The contribution made by {software Y} to {system Z} hazards is acceptable

Content:

Evaluation :

LifecycleEvent :

Public: true

Assumed: false

To Be Supported: false

To Be Instantiated: false

Figure 85 - Claim properties

Claims

These elements have the graphical notation as Goals on GSN. The identifier property indicates uniquely the claim on the argumentation. Do not use the same identification on different elements on the same argumentation.
Assumed property references the assumption concept and has the same graphical notation assumptions in GSN. It indicates an assumption in relation of a claim.
To be supported property indicates that the claim will be further developed on a future.

Argument Reasoning

This element has the same graphical notation as strategies on GSN. The identifier property indicates uniquely the element on the argumentation. Do not use the same identification on different elements on the same argumentation.
To be supported property indicated that the argument reasoning will be further developed on a future.

Information Element Citation

This element could have different graphical notations depending to the concept which is referencing. The property “Type” could have the values

- Justification: it references the justification concept and has the same graphical notation as justifications in GSN. It justifies the validity of a claim.
- Context: it references the context concept and has the same graphical notation as contexts in GSN. It indicates the context of a claim.
- Solution: it references the evidence concept and has the same graphical notation as solutions in GSN. It supports the validity of a claim.

The identifier property indicates uniquely the element on the argumentation. Do not use the same identification on different elements on the same argumentation.

Information elements references to a specific artefact. The url property indicates the location of the artefact associated. See section “Connecting a Diagram to Artefacts” for further details for information on these artefacts.

Argumentation

This element has the same graphical notation as modules on GSN. The identifier property indicates uniquely the element on the argumentation. Do not use the same identification on different elements on the same argumentation.

The Location attribute indicates where is stored the argumentation diagram file with the content of the module. By default is should be stored on the places indicated on the preferences.

6.3.1.1 Copying and Pasting an Element

Elements in a diagram can be copied and pasted.

To copy an element, select the element and click “Copy” in the “Edit” menu. The copied element can be pasted by clicking “Paste” in the “Edit” menu without selecting any element.

6.3.1.2 Deleting a Node or a Link

Please, do not press the Del key. The element will not be completed deleted.

To delete a node or a link, click to select the node/link and perform either of the following steps.

1. Press the “BS” key.

2. Right click the item and select “Delete from Model” from the context menu.

PS: An argument can be deleted. But child elements are also deleted and the argument cannot be edited ever.

6.3.2 Create multi-diagrams from an Argumentation model

The tool allows managing different views of a model through a set of diagrams. Once a model is available, a new diagram view can be created and special edition functionalities are available as follows:

1. Thanks to the Outline view, it is possible to drag and drop concepts from the model to the diagram.
2. Once a concept has been selected, it can be hidden through the “Delete from diagram” option available in the contextual menu. This option does not delete the concept from the model.
3. Once a concept has been selected, it can be deleted through the “Delete from model” option available in the contextual menu. This option delete the concept from the model permanently. If this deleted concept is visible in another diagram files, this concepts will be shown with a cross icon in the upper right corner to show that it does not exist anymore.

Create multi-diagrams in File Format

Once a model is available, a new diagram view can be created by using the “Initialize arg_diagram diagram file” option in the contextual menu.

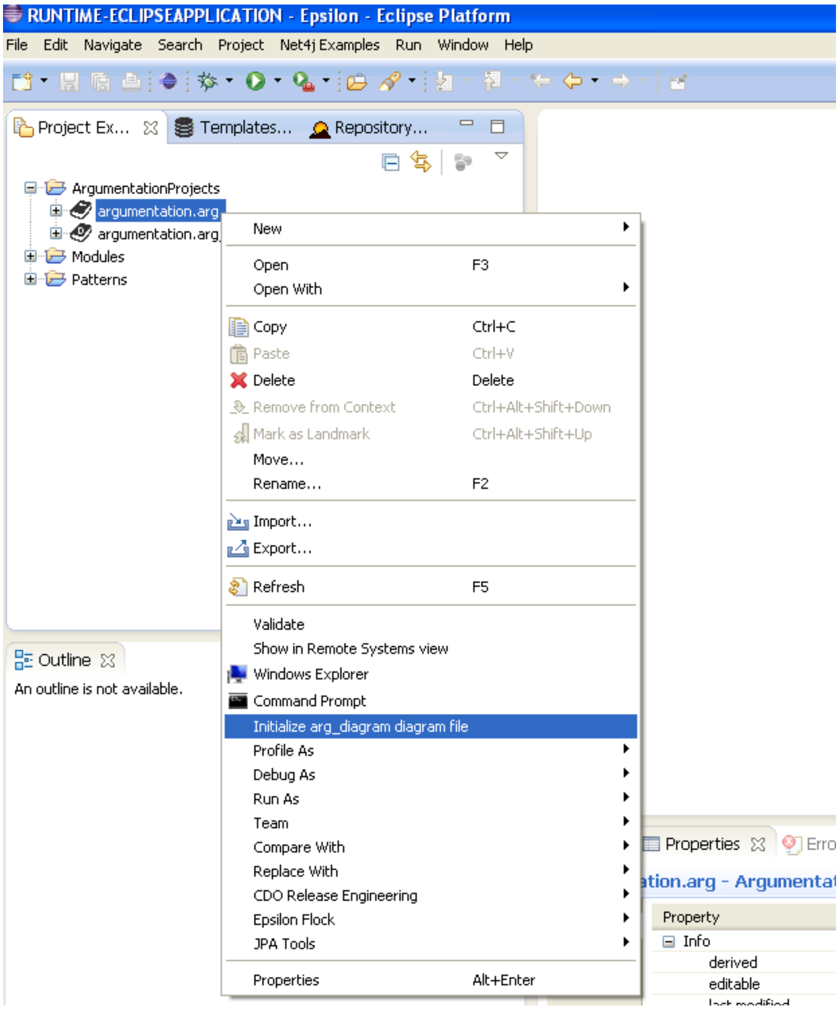


Figure 86 - Initialize a diagram file

This option launches a wizard that at the first step requires the folder and the name of the new diagram file. Next, the root element of the model (Case type) must be selected as the root element of the new diagram. After that, the diagram is ready for edition.

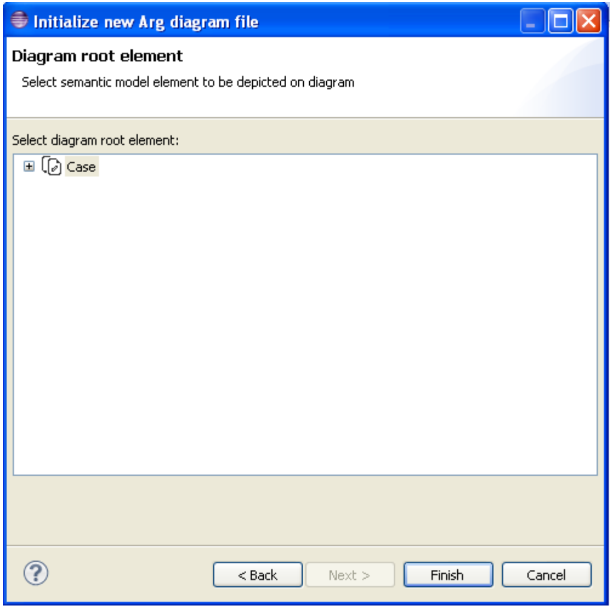

Initialize new Arg diagram file
Diagram root element
Select semantic model element to be depicted on diagram
Select diagram root element:
Case
< Back
Next >
Finish
Cancel

Figure 87 - Selection of the Case root element

Create multi-diagrams in Database Format

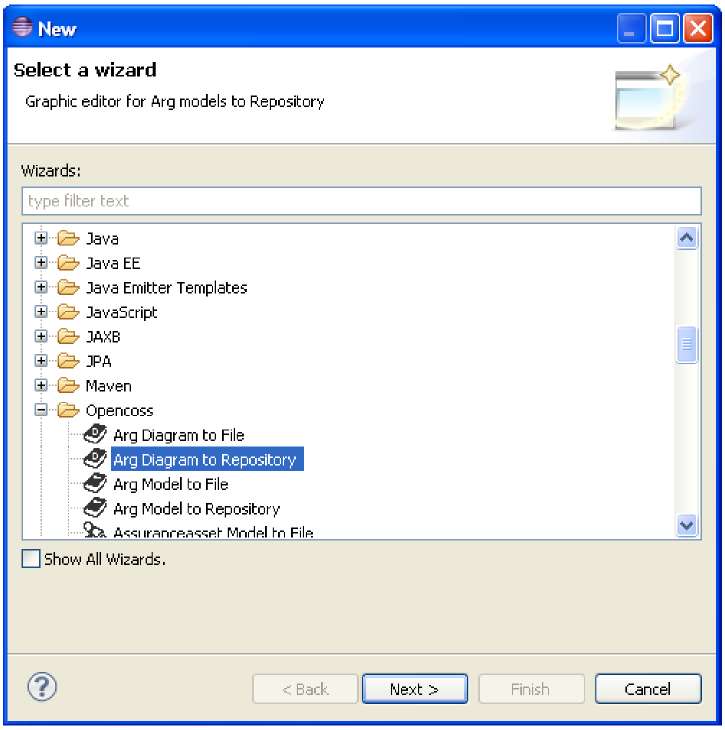
Once a model is available, a new diagram view can be created following the procedure below.

Select “New” → “Other…” from the File menu of eclipse

Select “Arg Diagram to Repository” in the Opencoss category and click the “Next” button.

Select the folder to store the new diagram. Then type the name of the diagram to be created and click the “Next” button.

Type the name of the model created previously and click the “Finish” button.



New

Select a wizard

Graphic editor for Arg models to Repository

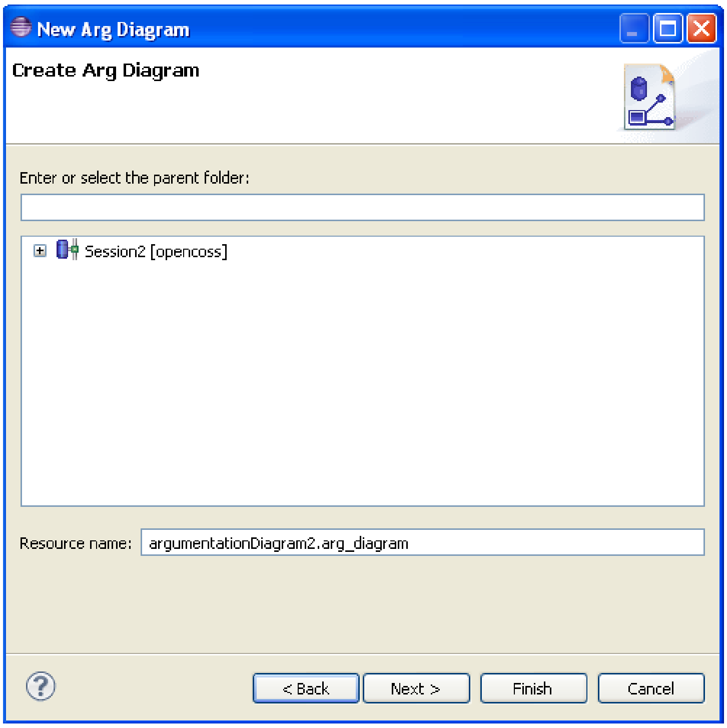
Wizards:

type filter text

- Java
- Java EE
- Java Emitter Templates
- JavaScript
- JAXB
- JPA
- Maven
- Opencoss
  - Arg Diagram to File
  - Arg Diagram to Repository
  - Arg Model to File
  - Arg Model to Repository
  - Assuranceasset Model to File

□ Show All Wizards.

Figure 88 - Database-based Argumentation Diagram wizard I



New Arg Diagram

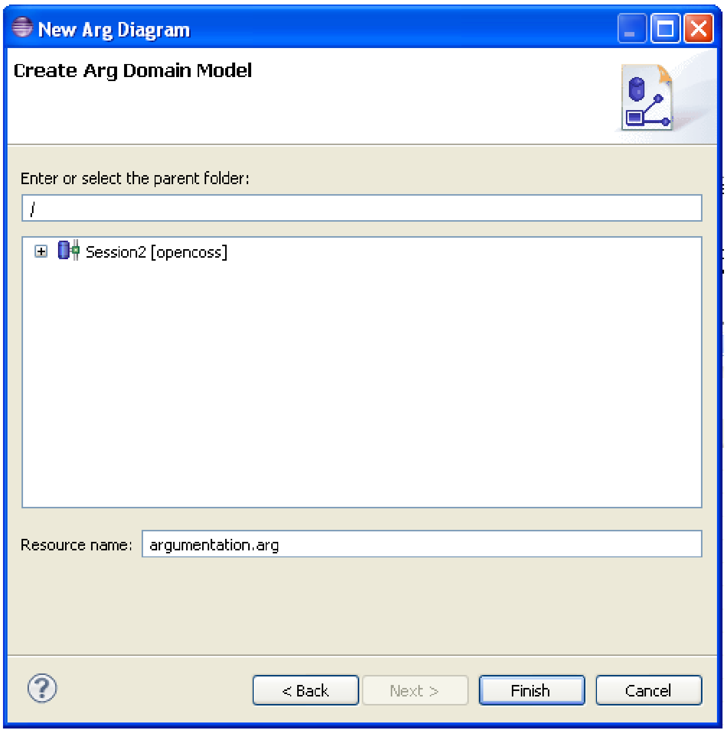
Create Arg Diagram

Enter or select the parent folder:

- Session2 [opencoss]

Resource name: argumentationDiagram2.arg_diagram

Figure 89 - Database-based Argumentation Diagram wizard II



New Arg Diagram

Create Arg Domain Model

Enter or select the parent folder:

/

Session2 [opencoss]

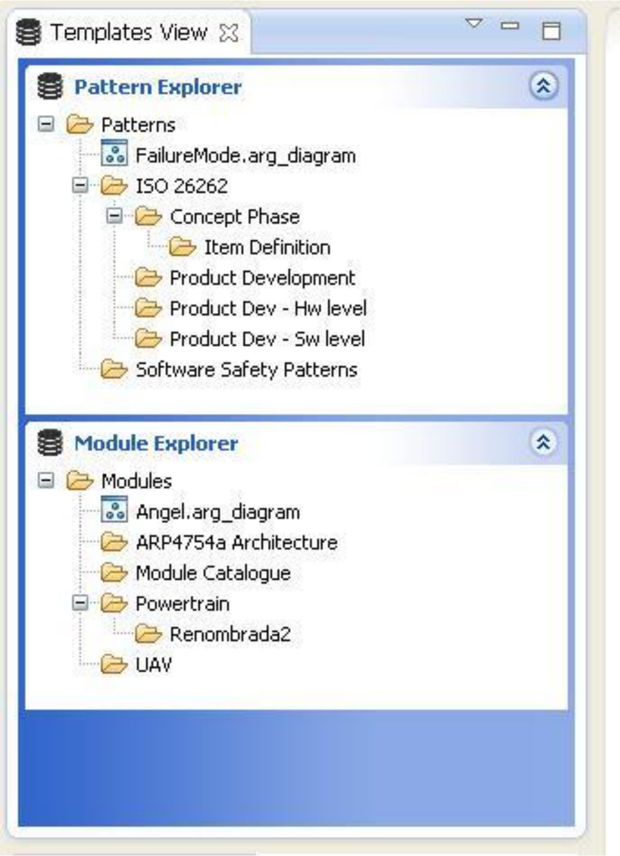
Resource name: argumentation.arg

Figure 90 - Database-based Argumentation Diagram wizard III

After that, the diagram is ready for edition.

6.3.3 Editing a Diagram Using a Pattern or a Module

In order to display the Template View, follow the next steps: Go to window→ Show View →Other
On the Menu expand the Opencoss category and select the Templates view.
Double click on a folder will expand the folder. Double click on an Argumentation Diagram file (.arg_diagram) will open the diagram in the editing window.



Templates View

Pattern Explorer
- Patterns
  - FailureMode.arg_diagram
  - ISO 26262
    - Concept Phase
      - Item Definition
    - Product Development
    - Product Dev - Hw level
    - Product Dev - Sw level
  - Software Safety Patterns

Module Explorer
- Modules
  - Angel.arg_diagram
  - ARP4754a Architecture
  - Module Catalogue
  - Powertrain
    - Renombrada2
  - UAV

Figure 91 - Argumentation Templates View

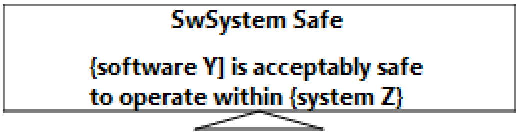
Modules and Patterns are stored on places determines by the preferences (see previous section)
The Patterns and Modules should be stored as ready to be reused. From the Template view, the drag and drop operation is activated in order to reuse the pattern or module on the actual argumentation.

6.3.3.1 Creating a New Pattern Diagram

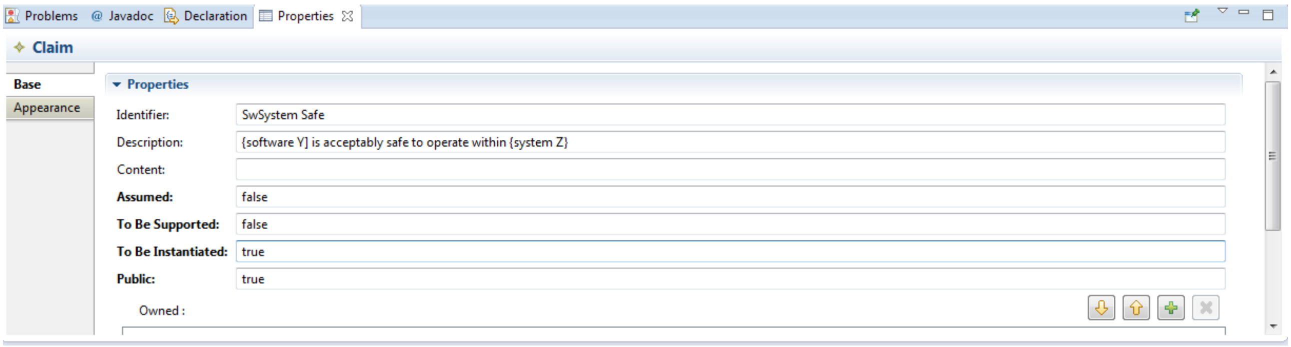
To create a new Argumentation Pattern diagram, follow the procedure of “Creating a New Diagram”. The only difference with other argumentation diagrams is that Patterns need to be stored on the places designed by the preferences. By default preferences point to a project called “Patterns” on the workspace.

6.3.3.2 Editing a Pattern Diagram

Proceed as explained in the “Editing a Diagram” section.
Remember only Pattern Diagrams support structural and entity abstraction. Structural abstractions like multiplicity or optionality are available through “Multiextension” and “Cardinality” properties of relationships. In addition, structural options are addressed by a “Choice”[1] relationship.
Entity abstraction can be accomplished by “To Be Instantiated” and “To Be Developed” properties.
While editing a claim one of the properties than can be change is “To be instantiated”, when its value it “true” then the node will change its graphics



[1] At creation time the “Choice” link must be placed inside its source node



Claim

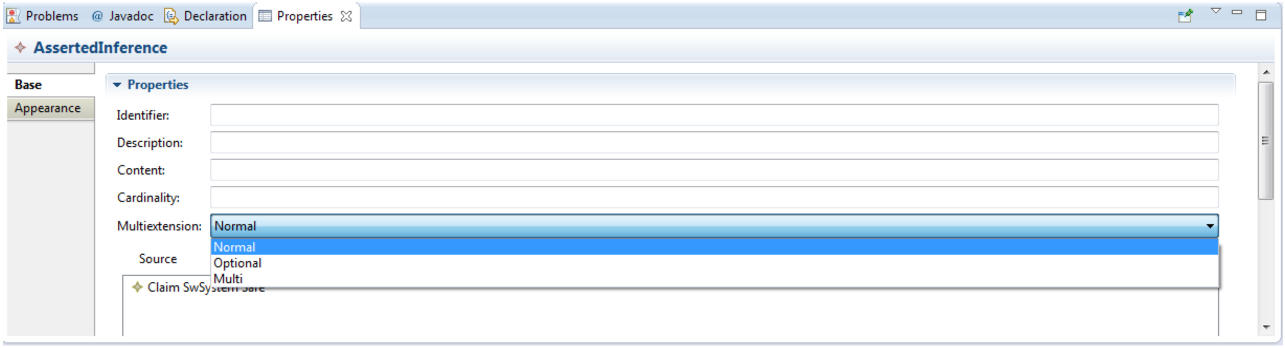
Properties

Identifier: SwSystem Safe
Description: {software Y} is acceptably safe to operate within {system Z}
Content:
Assumed: false
To Be Supported: false
To Be Instantiated: true
Public: true
Owned :

Figure 92 - Claim properties (To Be Instantiated)

The “AssertedInference” has a property called “multiextension” with three different values:

- Normal: is behaves as a regular connection. It has the “supported by” graphical notation
- Optional: it indicates that this connection is optional or alternative connections between the nodes
- Multi: it indicates the generalised n-ary relationships between the nodes. When this option is selected, the attribute “cardinality” should also be modify indicating the “n” value



AssertedInference

Properties

Identifier:
Description:
Content:
Cardinality:
Multiextension: Normal
Source
Claim SwSystem Safe

Figure 93 - Claim properties (Multiextension)

The “choice” relationship is specific for patterns edition. For editing, select the Choice at the Palette and then placed it inside its associated top Claim. The graphic for the choice relationship will appear affixed to it. Then add as many asserted inferences as number of possible choices.

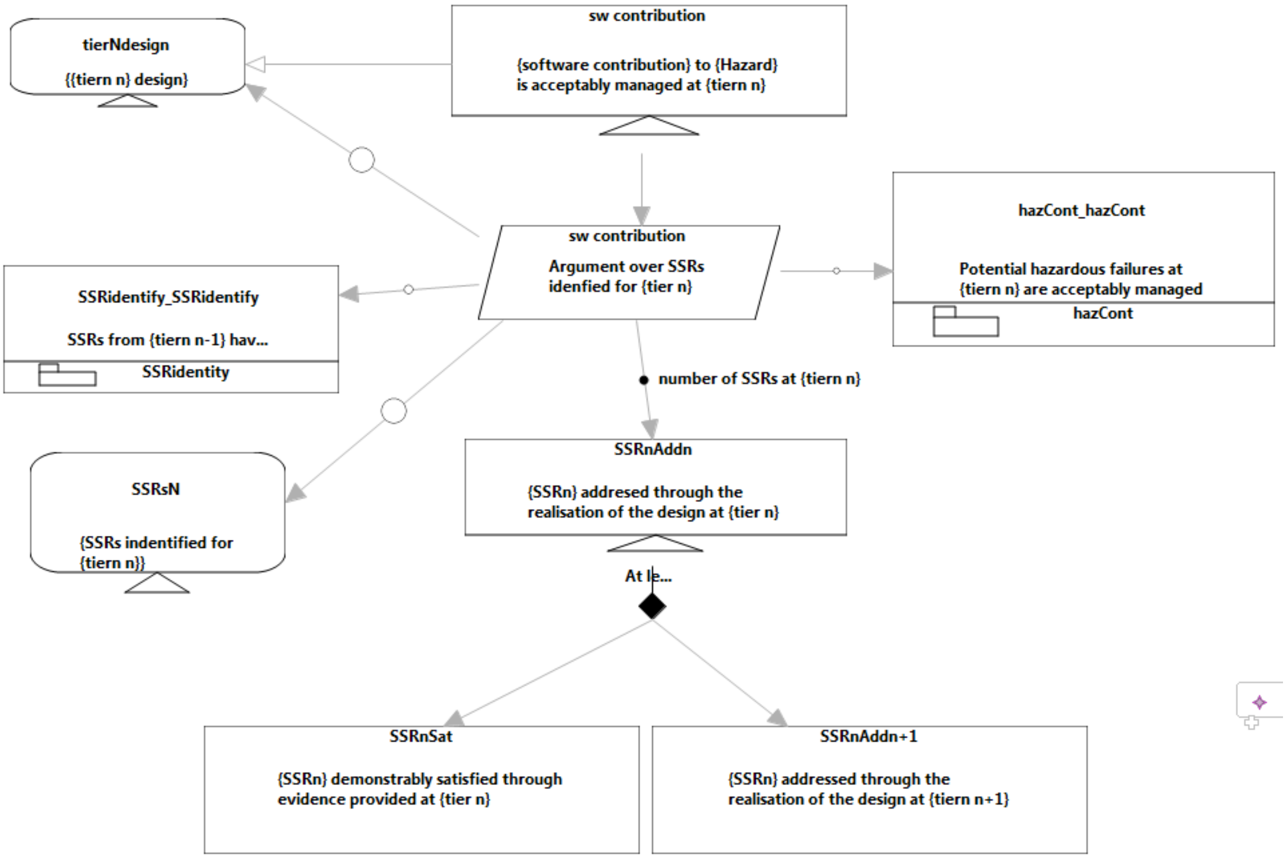

tierNdesign
{{tiern n} design}
sw contribution
{software contribution} to {Hazard} is acceptably managed at {tiern n}
hazCont_hazCont
Potential hazardous failures at {tiern n} are acceptably managed
hazCont
sw contribution
Argument over SSRs idenfied for {tier n}
SSRidentify_SSRidentify
SSRs from {tiern n-1} hav...
SSRidentity
number of SSRs at {tiern n}
SSRsN
{SSRs indentified for {tiern n}}
SSRnAddn
{SSRn} addresed through the realisation of the design at {tier n}
At le...
SSRnSat
{SSRn} demonstrably satisfied through evidence provided at {tier n}
SSRnAddn+1
{SSRn} addressed through the realisation of the design at {tiern n+1}

Figure 94 - Example of a pattern

6.3.3.3 Adding Elements from Patterns to a Diagram (instantiating a Pattern)

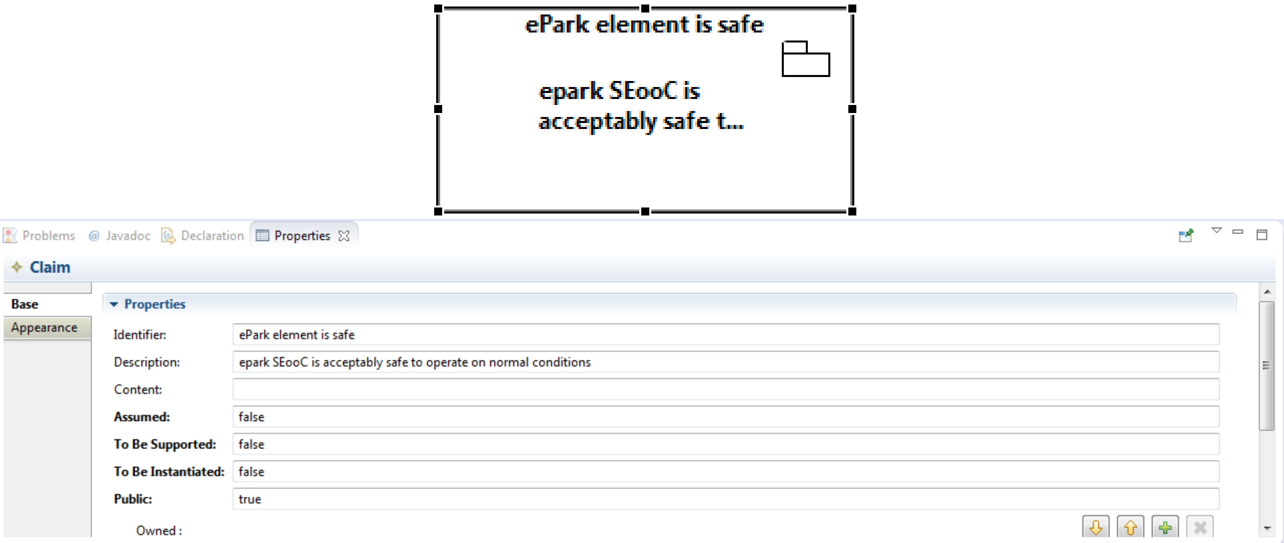
An Argument Pattern can be instantiated (thus all its content copied) into the diagram under edition.
To proceed, drag and drop a Pattern Diagram file into the diagram under edition. You need to open the argumentation diagram uncompleted that needs to include the pattern. Go to the templates view, select the pattern you are interested in, once selected you can drag and drop it into the editing part of the diagram. Once you drop you will see the new elements that have been copied into your argumentation diagram.
Once the drop is done, the “Arrange Selection” feature can be used to move to all the nodes and links. This feature can be found on the top menus as a button.

6.3.3.4 Creating a New Module Diagram

To create a new argumentation Pattern diagram, follow the procedure of “Creating a New Diagram” but generating the new diagram into the Modules directories. The only difference with other argumentation diagrams is that Modules need to be stored on the places designed by the preferences. By default preferences point to a project called “Modules” on the workspace.

6.3.3.5 Editing a Module Diagram

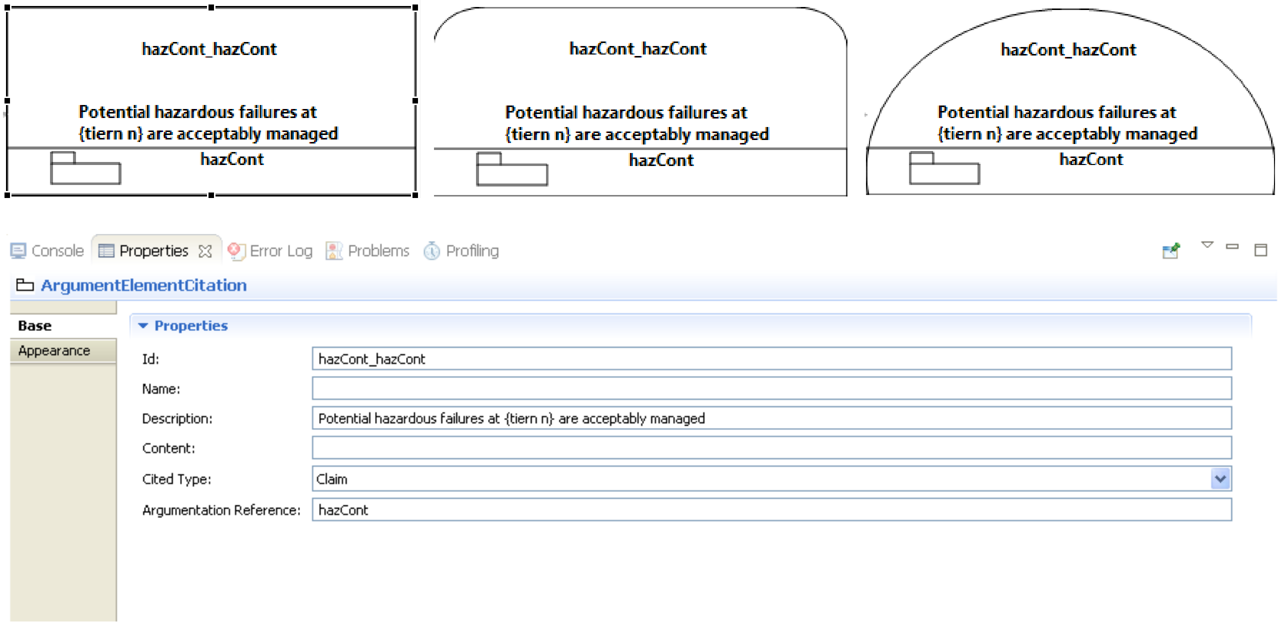
Proceed as explained in the “Editing a Diagram” section.
Remember Modules Diagrams (“Argumentation”) allows representing interrelated modules of argumentations. An “Argument Element Citation” repeats an element presented in another argumentation module which is used to support the argument in the local module. “Public” property indicates that an element is visible to other modules where it can be referenced. While an “Agreement” element represents the agreed relationship between modules.
To indicate that a claim is Public, just indicate on the Claim properties view, the attribute “Public” be “true”. The Public activation is also noticed on the graphic notation.



Identifier: ePark element is safe
Description: epark SEooC is acceptably safe to operate on normal conditions
Content:
Assumed: false
To Be Supported: false
To Be Instantiated: false
Public: true
Owned :

Figure 95 - Claim properties (declared as Public)

Argument Element Citations can represent different concepts; they can reference a claim, a context or a solution. On the properties view, an attribute called “cited type” should be informed and consequently the graphic notation might change.


hazCont_hazCont
Potential hazardous failures at {tiern n} are acceptably managed
hazCont
hazCont_hazCont
Potential hazardous failures at {tiern n} are acceptably managed
hazCont
hazCont_hazCont
Potential hazardous failures at {tiern n} are acceptably managed
hazCont
Console
Properties
Error Log
Problems
Profiling
ArgumentElementCitation
Base
Appearance
Properties

Id: hazCont_hazCont
Name:
Description: Potential hazardous failures at {tiern n} are acceptably managed
Content:
Cited Type: Claim
Argumentation Reference: hazCont

Figure 96 - ArgumentElementCitation properties (reference to a claim)

The “Argumentation Reference” property indicates the reference to the module in which this citation element is described.

6.3.3.6 Adding Elements from Modules to a Diagram (instantiating a Module)

An Argumentation Module can be instantiated (thus all its content copied) into the diagram under edition. To proceed, drag and drop a Module Diagram file into the diagram under edition.
Once is its instantiated an “argumentation” graphic notation will appear on your diagram.

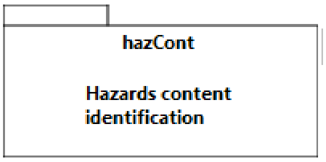


Figure 97 - Argumentation Module

By double clicking on this Argumentation another diagram will appear with the argumentation context of this module. The url property indicates the location of this diagram.

6.3.4 Connecting a Diagram to Artefacts

Firstly, proceed to load the evidences model (.evidence) from the repository. So, press the Outline and select “Load Resource” in the context menu.

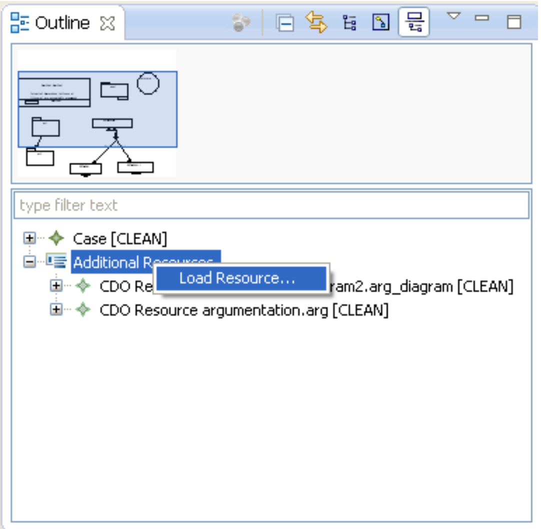

Outline
type filter text
Case [CLEAN]
Additional Resources
Load Resource...
CDO Re...ram2.arg_diagram [CLEAN]
CDO Resource argumentation.arg [CLEAN]

Figure 98 - Load Resource to Argumentation Diagram

Then browse into the workspace to select the evidences model resource.

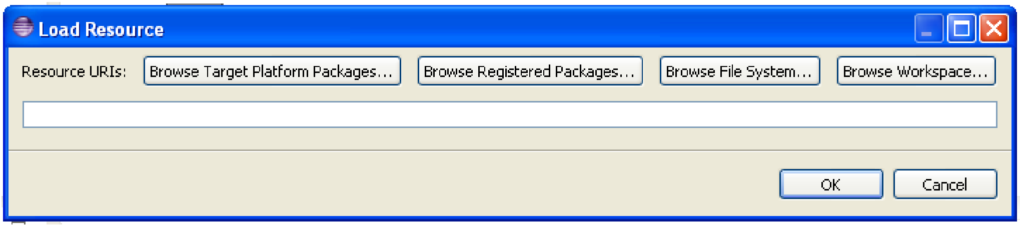
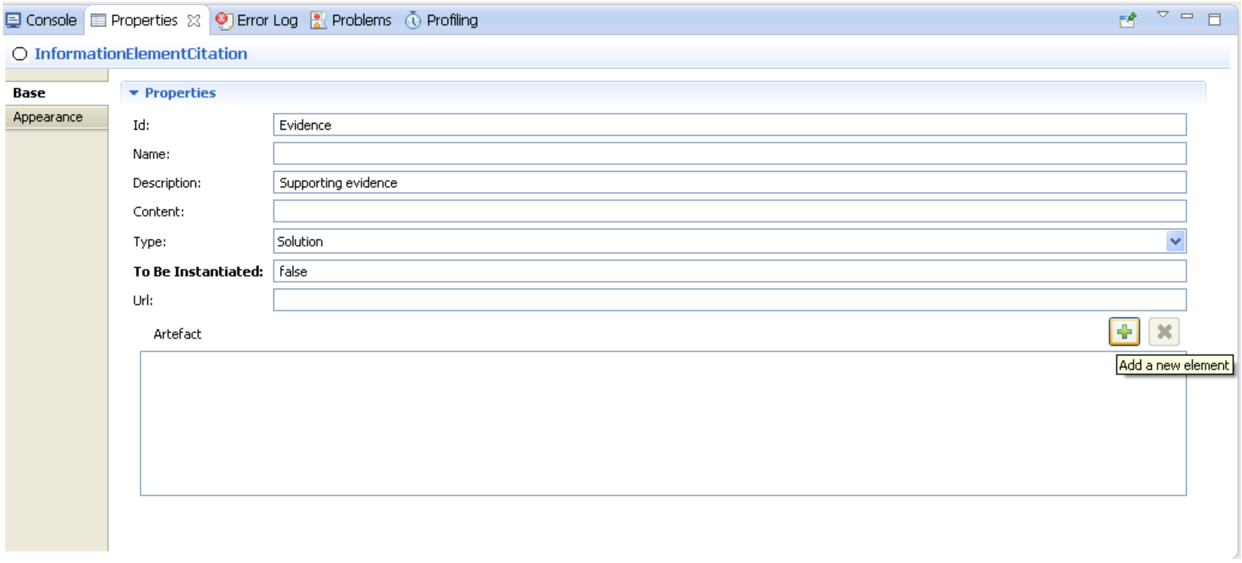


Figure 99 - Select Evidence model as resource

Now, information element citations can be related to its artefacts. To carry out, select an “Information Element Citation” and press “+” operator in Artefact section.



Id: Evidence
Name:
Description: Supporting evidence
Content:
Type: Solution
To Be Instantiated: false
Url:

Figure 100 - Artefact selection as Information Element Citation

A pop-up window will show the Artefacts Model at “All Resources” tab. Finally, choose the required artefact.

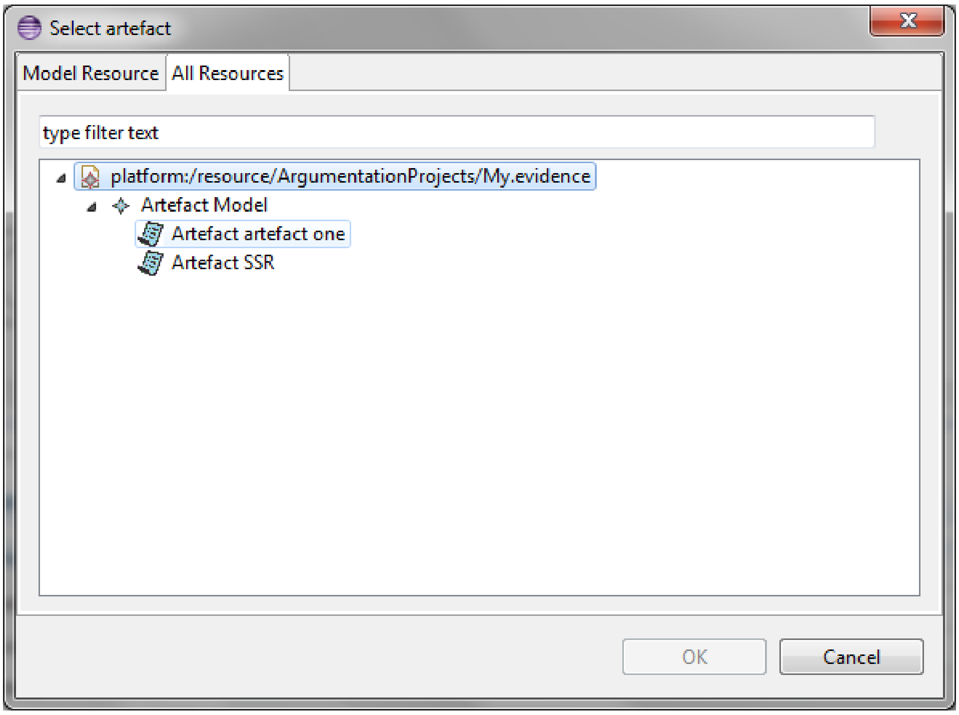
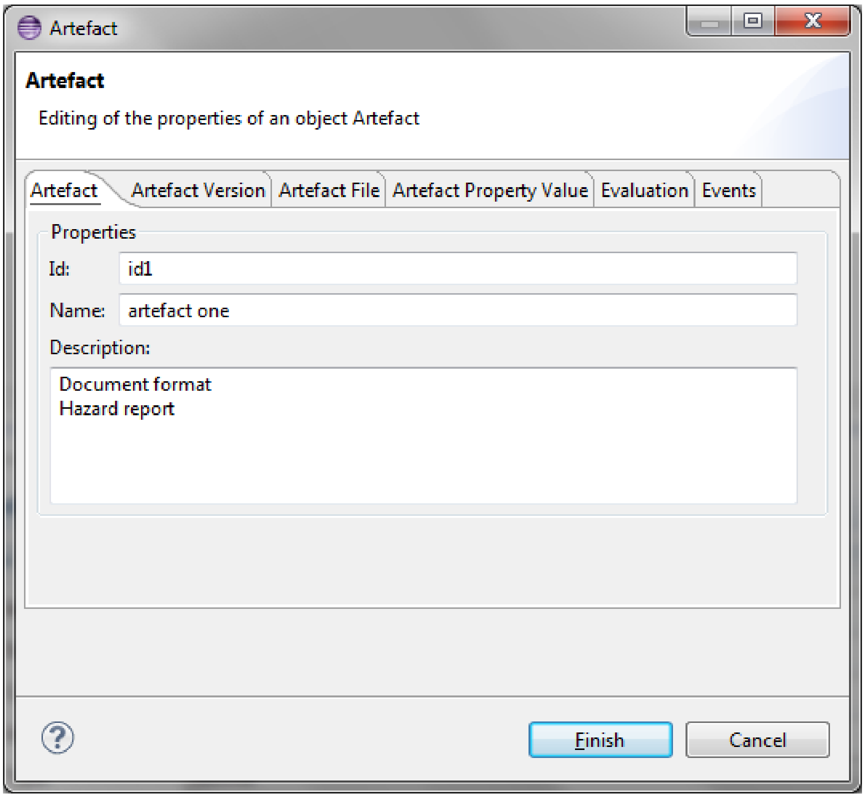


Figure 101 - Artefact selection from resources

In addition, it is possible to launch the artefact editor by double click on one artefact instance as shown below.



Artefact

Editing of the properties of an object Artefact

Properties

Id: id1

Name: artefact one

Description:

Document format
Hazard report

Figure 102 - Artefact edition form

6.4 Argumentation Contracts

A contract is essentially a recording of an agreement between two or more entities. In the case of argumentation modules in OPENCOSS, a contract records how an inter-module dependency (a public claim to be supported in a module) is resolved by the claims and evidence provided by other argumentation modules

6.4.1 Preparation for Contracts

Create two or more argumentation diagrams (see Section 6.2.1 Database Format). In each of these diagrams (or their accompanying models), an "Argumentation" (GSN module symbol in the palette) should be created (Figure 103). Argument elements such as Claims, Information Element Citations, and Argument Reasoning should then be added to the Argumentation (module) element. This is achieved by right clicking on the Argumentation element and selecting "Show Properties View", clicking on the "+" button on the "Consist Of" property, and selecting the model elements that should be added to the argumentation element. The "+" button for the "Consist Of" property in the properties view for an Argumentation (module) is shown in Figure 104.

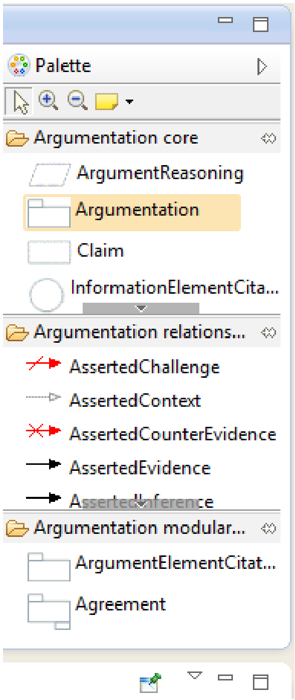
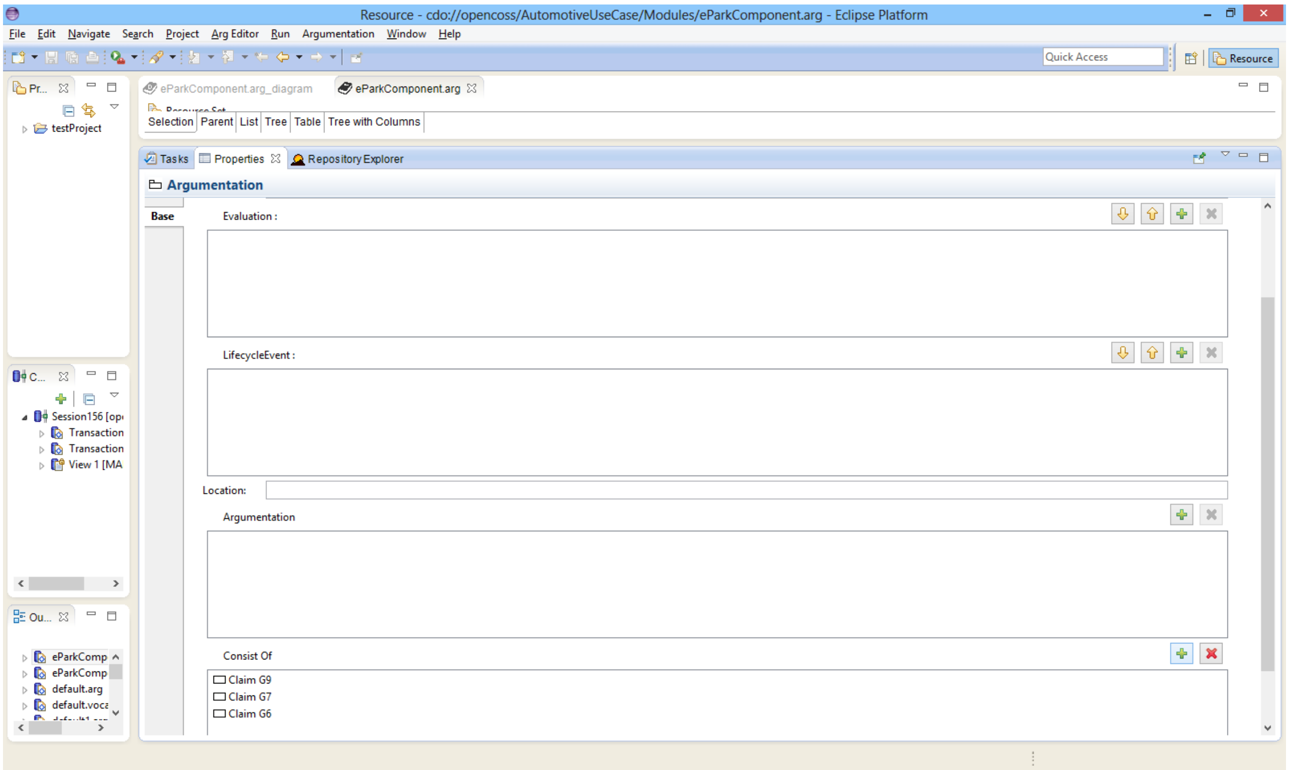


Figure 103 Creating an Argumentation (Module)


Resource - cdo://opencoss/AutomotiveUseCase/Modules/eParkComponent.arg - Eclipse Platform
File Edit Navigate Search Project Arg Editor Run Argumentation Window Help
Quick Access
Resource
Pr...
testProject
eParkComponent.arg_diagram
eParkComponent.arg
Resource Set
Selection Parent List Tree Table Tree with Columns
C...
Session156 [op
Transaction
Transaction
View 1 [MA
Ou...
eParkComp
eParkComp
default.arg
default.vocz
Tasks Properties Repository Explorer
Argumentation
Base

Evaluation :

LifecycleEvent :

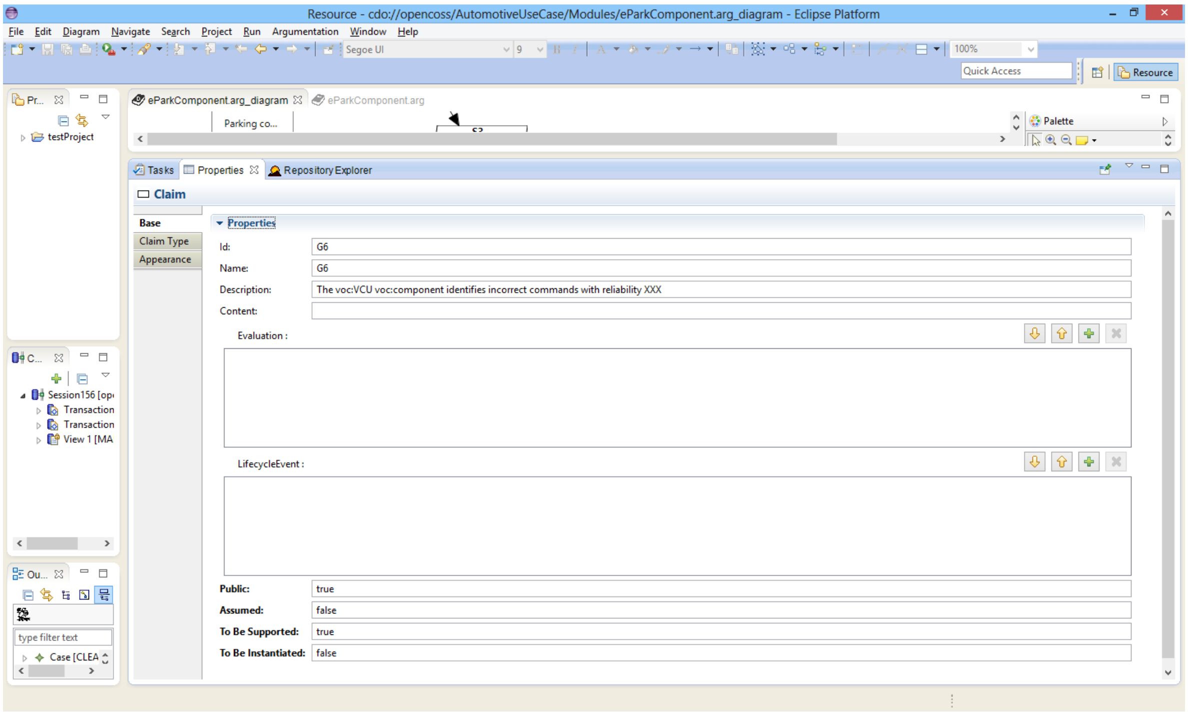
Location:

Argumentation

Consist Of
□ Claim G9
□ Claim G7
□ Claim G6

Figure 104 "Consist Of" Property for an Argumentation (Module)

To declare that an inter-module dependency exists, a Claim element in a module should have the properties "public" and "to be supported" set to true (Figure 105). There can be multiple dependencies.


Resource - cdo://opencoss/AutomotiveUseCase/Modules/eParkComponent.arg_diagram - Eclipse Platform
File Edit Diagram Navigate Search Project Run Argumentation Window Help
Quick Access
Resource
ePark Component.arg_diagram
ePark Component.arg
Palette
Tasks
Properties
Repository Explorer
testProject
Session156 [ope
Transaction
Transaction
View 1 [MA
type filter text
Case [CLEA
Base
Claim Type
Appearance

Claim

Properties

Id: G6

Name: G6

Description: The voc:VCU voc:component identifies incorrect commands with reliability XXX

Content:

Evaluation :

LifecycleEvent :

Public: true

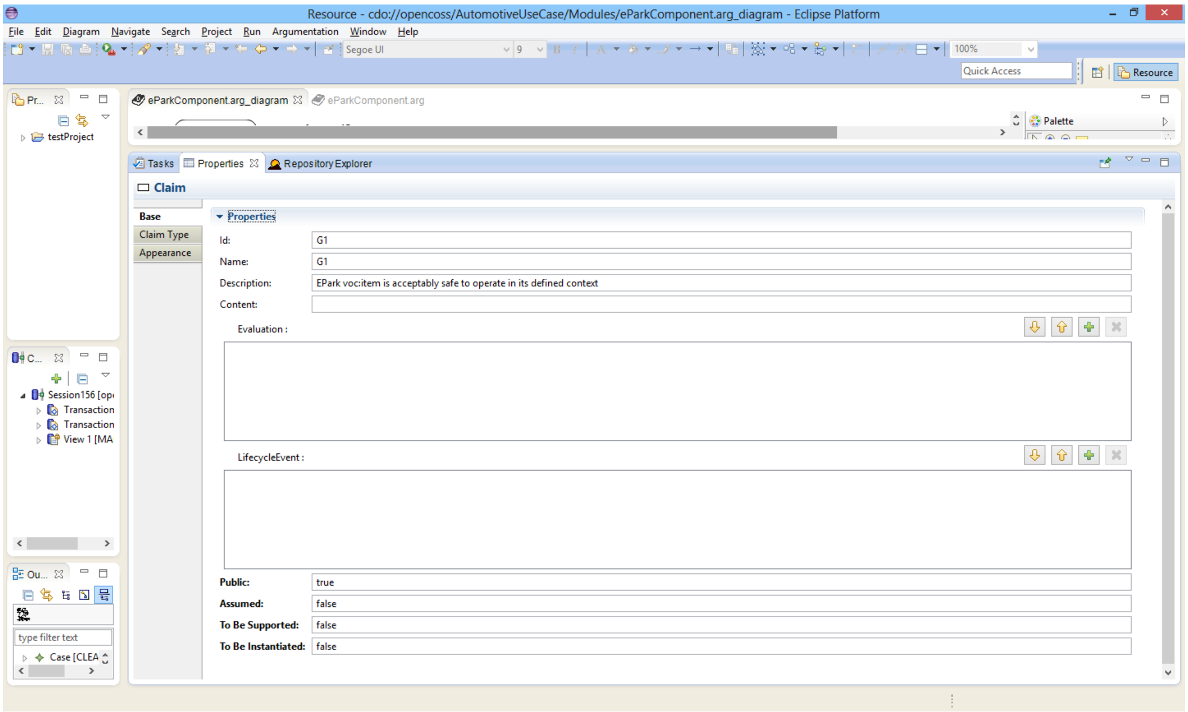
Assumed: false

To Be Supported: true

To Be Instantiated: false

Figure 105 "To Be Supported" and "Public" Property Values for Declaring a Claim Requiring Support from Another Module

To declare that a Claim can provide support to resolving inter-module dependencies, the "Public" property should be set to "true" and the "To Be Supported" property should be set to "false" (Figure 106).


Resource - cdo://opencoss/AutomotiveUseCase/Modules/eParkComponent.arg_diagram - Eclipse Platform
File Edit Diagram Navigate Search Project Run Argumentation Window Help
Quick Access
Resource
ePark Component.arg_diagram
ePark Component.arg
Palette
Tasks
Properties
Repository Explorer
testProject
Session156 [ope
Transaction
Transaction
View 1 [MA
type filter text
Case [CLEA
Base
Claim Type
Appearance

Claim

Properties

Id: G1

Name: G1

Description: EPark voc:item is acceptably safe to operate in its defined context

Content:

Evaluation :

LifecycleEvent :

Public: true

Assumed: false

To Be Supported: false

To Be Instantiated: false

Figure 106 "To Be Supported" and "Public" Property Values for Declaring a Claim Providing Support to Other Modules

Note, Information Element Citations, when used to model "Solutions", can also be used to provide support to inter-module dependencies. The "To Be Supported" property should be set to "False" in this case.

6.4.2 Creating a Contract

Having created argumentation models which consist of modules of model elements that require and/or provide support to other modules, contracts can be created to link such elements (thus resolving the inter-module dependencies). To create a contract, go to File —> New —> Other —> Opencoss —> Argumentation Contract to start the Contract Wizard (Figure 107).

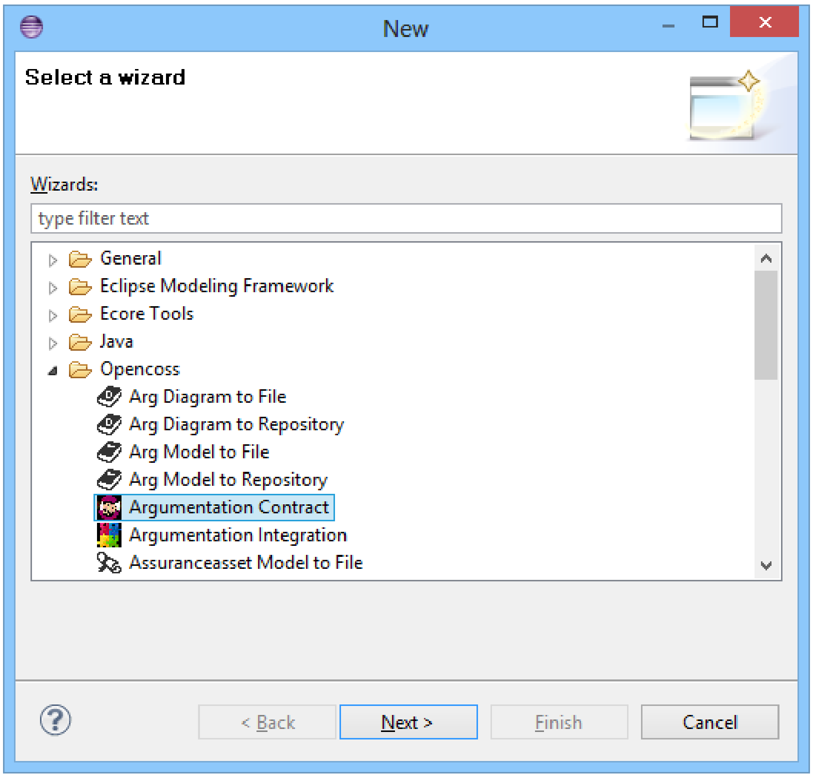
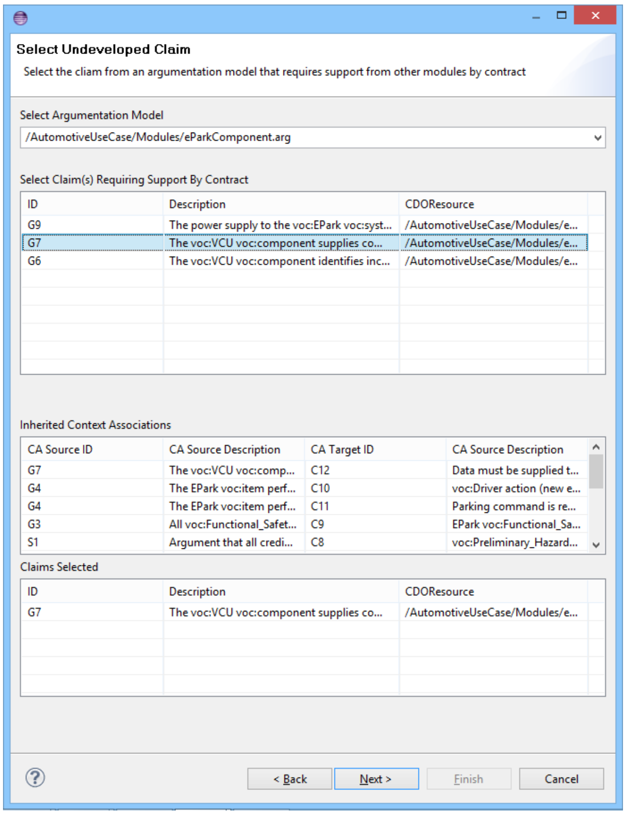


Figure 107 New Contract Wizard

In the first page of the wizard, selecting an argumentation model from the dropdown box will display a list of all inter-module dependencies (Claims that are public and to be supported) of all modules contained in the model. One of the Claims should be double clicked to select this as the inter-module dependency to be resolved by the contract being created (Figure 108). The second wizard page is similar to the first, except now the user should double click the claims and/or solutions that will resolve the dependency selected in the first wizard page (Figure 109). Note that one or more claims and/or solutions may be selected on this page. In the third page of the wizard, an explanation may be entered as to how the selected claims and/or solutions resolve the selected inter-module dependency (Figure 110). After completing the wizard, an argument diagram representing the contract is created and opened. This can be edited like any other argument diagram.



Select Undeveloped Claim

Select the cliam from an argumentation model that requires support from other modules by contract

Select Argumentation Model

/AutomotiveUseCase/Modules/eParkComponent.arg

Select Claim(s) Requiring Support By Contract

ID	Description	CDOResource
G9	The power supply to the voc:EPark voc:syst...	/AutomotiveUseCase/Modules/e...
G7	The voc:VCU voc:component supplies co...	/AutomotiveUseCase/Modules/e...
G6	The voc:VCU voc:component identifies inc...	/AutomotiveUseCase/Modules/e...

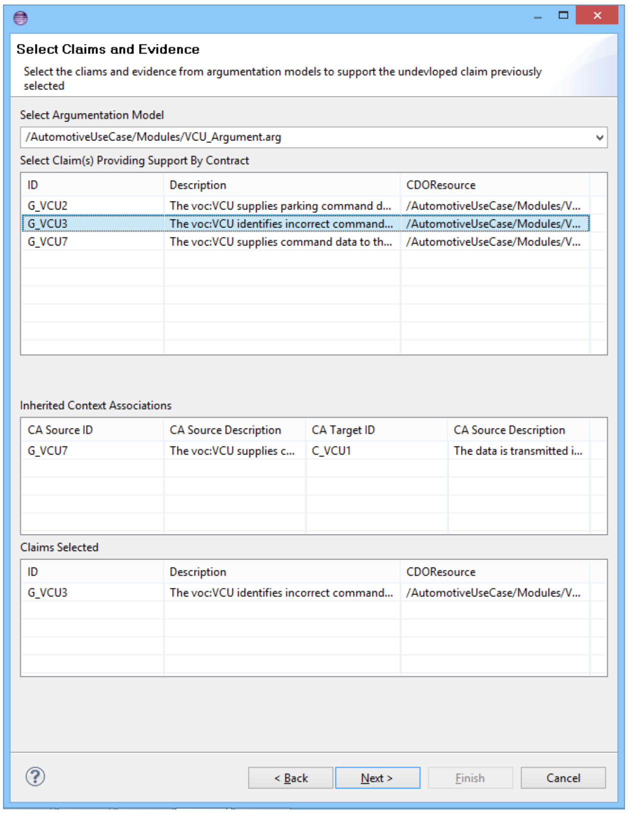
Inherited Context Associations

CA Source ID	CA Source Description	CA Target ID	CA Source Description
G7	The voc:VCU voc:comp...	C12	Data must be supplied t...
G4	The EPark voc:item perf...	C10	voc:Driver action (new e...
G4	The EPark voc:item perf...	C11	Parking command is re...
G3	All voc:Functional_Safet...	C9	EPark voc:Functional_Sa...
S1	Argument that all credi...	C8	voc:Preliminary_Hazard...

Claims Selected

ID	Description	CDOResource
G7	The voc:VCU voc:component supplies co...	/AutomotiveUseCase/Modules/e...

Figure 108 Selecting an Inter-Module Dependency



Select Claims and Evidence

Select the cliams and evidence from argumentation models to support the undevloped claim previously selected

Select Argumentation Model

/AutomotiveUseCase/Modules/VCU_Argument.arg

Select Claim(s) Providing Support By Contract

ID	Description	CDOResource
G_VCU2	The voc:VCU supplies parking command d...	/AutomotiveUseCase/Modules/V...
G_VCU3	The voc:VCU identifies incorrect command...	/AutomotiveUseCase/Modules/V...
G_VCU7	The voc:VCU supplies command data to th...	/AutomotiveUseCase/Modules/V...

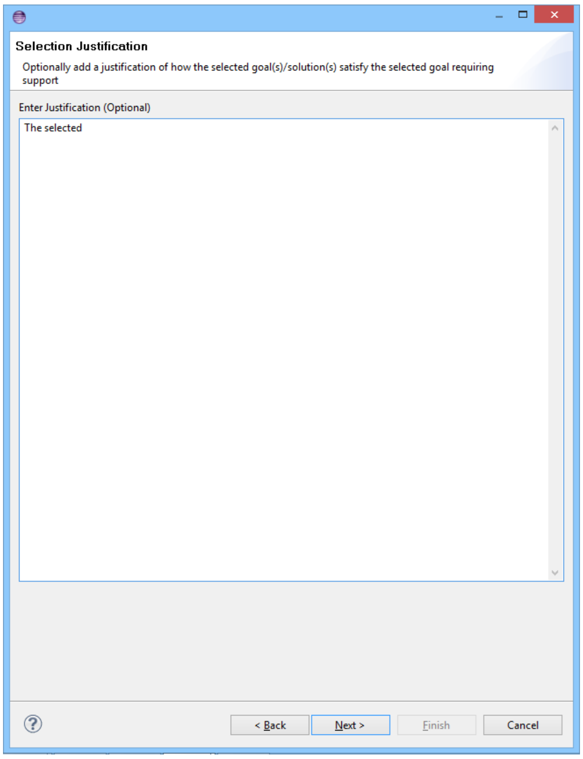
Inherited Context Associations

CA Source ID	CA Source Description	CA Target ID	CA Source Description
G_VCU7	The voc:VCU supplies c...	C_VCU1	The data is transmitted i...

Claims Selected

ID	Description	CDOResource
G_VCU3	The voc:VCU identifies incorrect command...	/AutomotiveUseCase/Modules/V...

Figure 109 Selecting Elements to Resolve the Dependency



Selection Justification

Optionally add a justification of how the selected goal(s)/solution(s) satisfy the selected goal requiring support

Enter Justification (Optional)

The selected

Figure 110 Justification of Dependency Resolution

6.5 Argumentation Integration

After creating contracts to resolve all argumentation inter-module dependencies, a system integration argument should be created to pull together the strands of argument from all of the modules of software components that comprise the system. To create a system integration argument go to File —> New —> Other —> Opencoss —> Argumentation Integration (Figure 111).

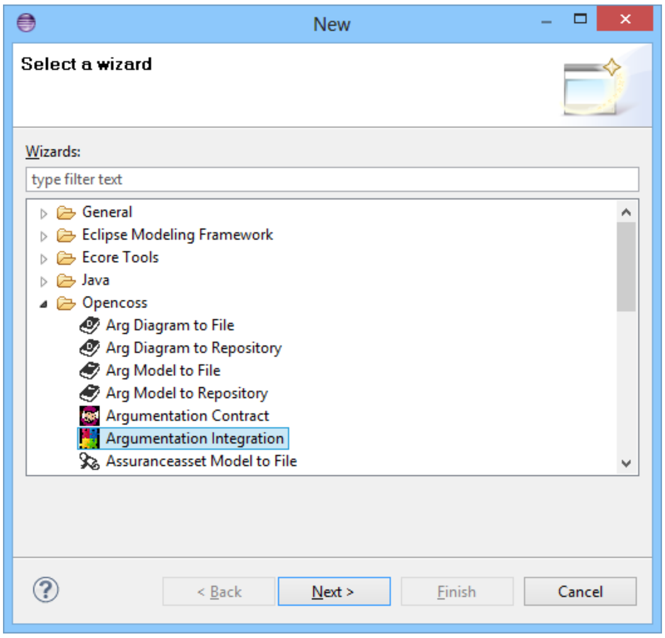
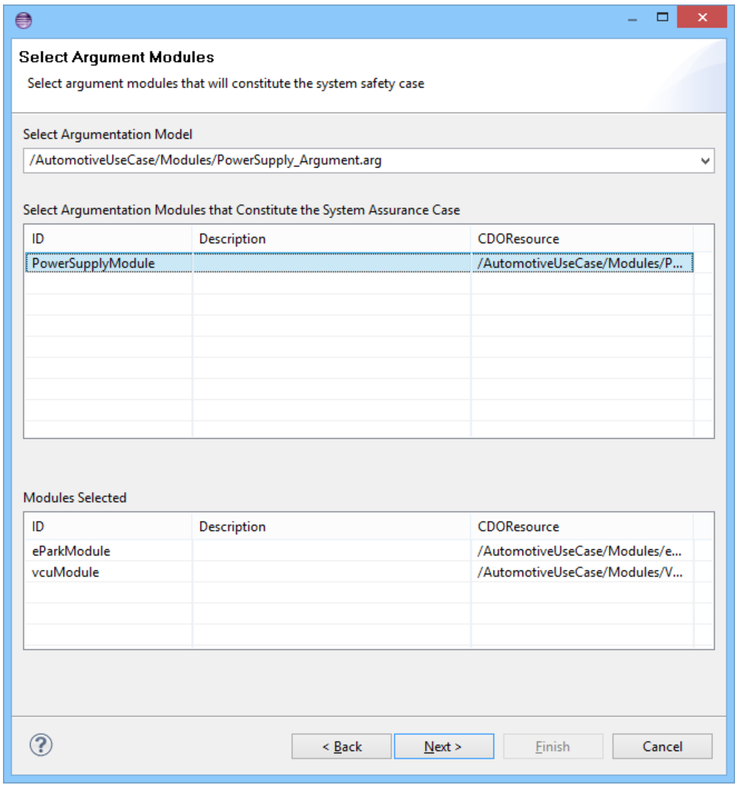


Figure 111 Argumentation Integration Wizard

The first wizard page, the user selects all of the argumentation modules that will comprise the system. The second page is where the user selects all of the contracts that resolve all inter-module dependencies of modules that will comprise the system.



Select Argument Modules

Select argument modules that will constitute the system safety case

Select Argumentation Model: /AutomotiveUseCase/Modules/PowerSupply_Argument.arg

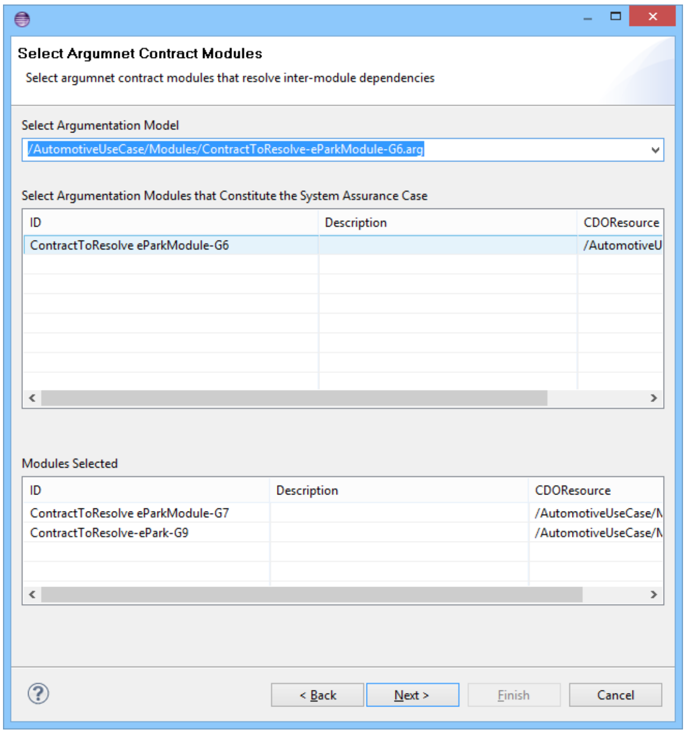
Select Argumentation Modules that Constitute the System Assurance Case

ID	Description	CDOResource
PowerSupplyModule		/AutomotiveUseCase/Modules/P...

Modules Selected

ID	Description	CDOResource
eParkModule		/AutomotiveUseCase/Modules/e...
vcuModule		/AutomotiveUseCase/Modules/V...

Figure 112 Select Argumentation Modules to Integrate



Select Argumnet Contract Modules

Select argumnet contract modules that resolve inter-module dependencies

Select Argumentation Model: /AutomotiveUseCase/Modules/ContractToResolve-eParkModule-G6.arg

Select Argumentation Modules that Constitute the System Assurance Case

ID	Description	CDOResource
ContractToResolve eParkModule-G6		/AutomotiveU

Modules Selected

ID	Description	CDOResource
ContractToResolve ePArkModule-G7		/AutomotiveUseCase/M
ContractToResolve-ePark-G9		/AutomotiveUseCase/M

Figure 113 Select Contracts that Resolve Inter-Module Dependencies of Modules Previously Selected

6.6 Argumentation Change Management

After integrating argumentation (Section 6.5), it is possible to check whether argument modules which comprise the system have changed in ways which might compromise the integrity of the contracts that have been created. The user should click Argumentation —> Argumentation Change Analysis.

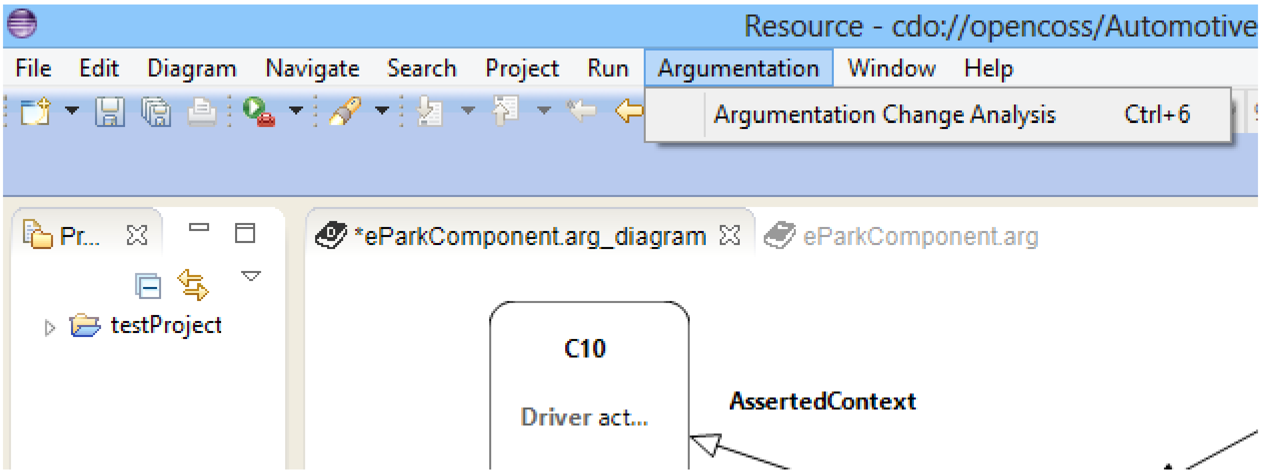
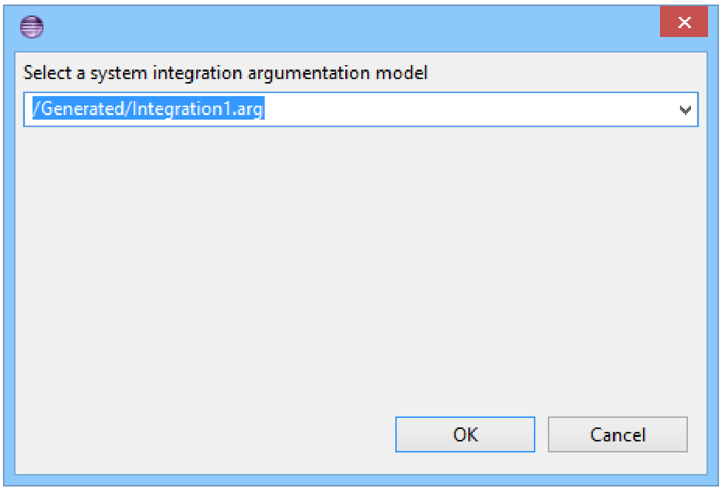


Figure 114 Argumentation Change Analysis

The user should then select the system integration argumentation model that was generated from Section 6.5.The results of the analysis will then be displayed.



Select a system integration argumentation model

/Generated/Integration1.arg

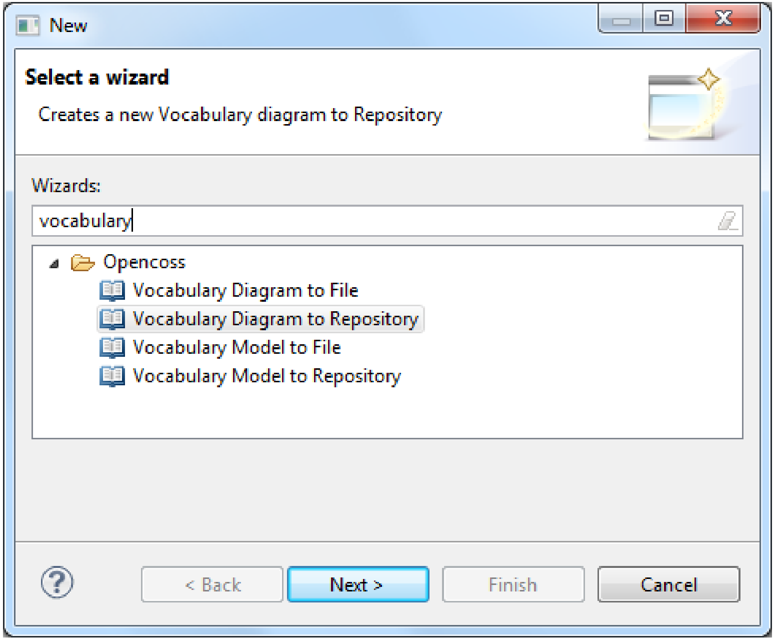
Figure 115 Select Argumentation Integration Model to Analyse

6.7 Vocabulary

The safety argumentation supports the usage of terms and term categories which have been defined in a vocabulary. The meaning of some terms and categories is specific to legislative regulations, standards and or the project they are used in. Vocabularies capture the meaning of such terms and categories by providing a definition.

6.7.1 Defining Vocabularies

The simplest way to define a vocabulary is to create one in the project where it going to be used. They can be stored either locally in a file or inside a remote repository.



New

Select a wizard

Creates a new Vocabulary diagram to Repository

Wizards:

vocabulary

- Opencoss
  - Vocabulary Diagram to File
  - Vocabulary Diagram to Repository
  - Vocabulary Model to File
  - Vocabulary Model to Repository

Figure 116 – New Vocabulary

The vocabulary can be visualized in a diagram to which shows how terms are related to each other. The diagram is a visualization of the vocabulary model but can also be used to edit the model.

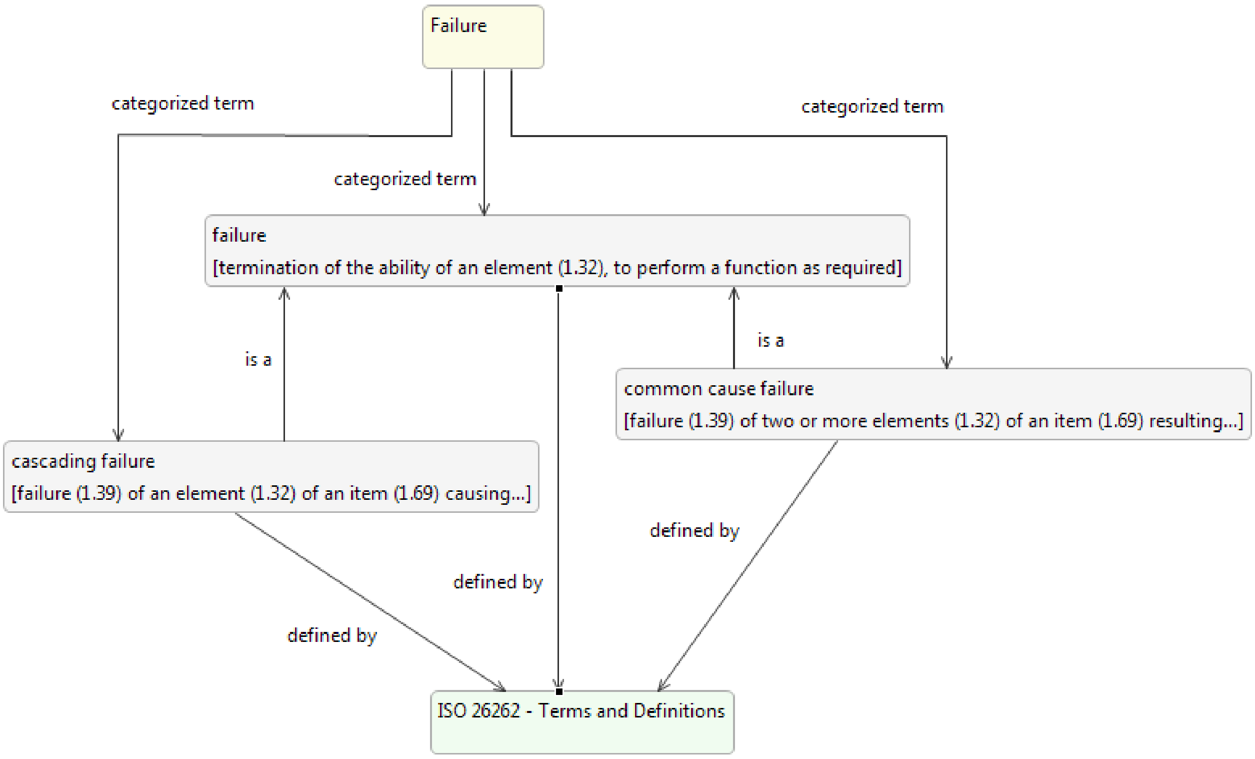
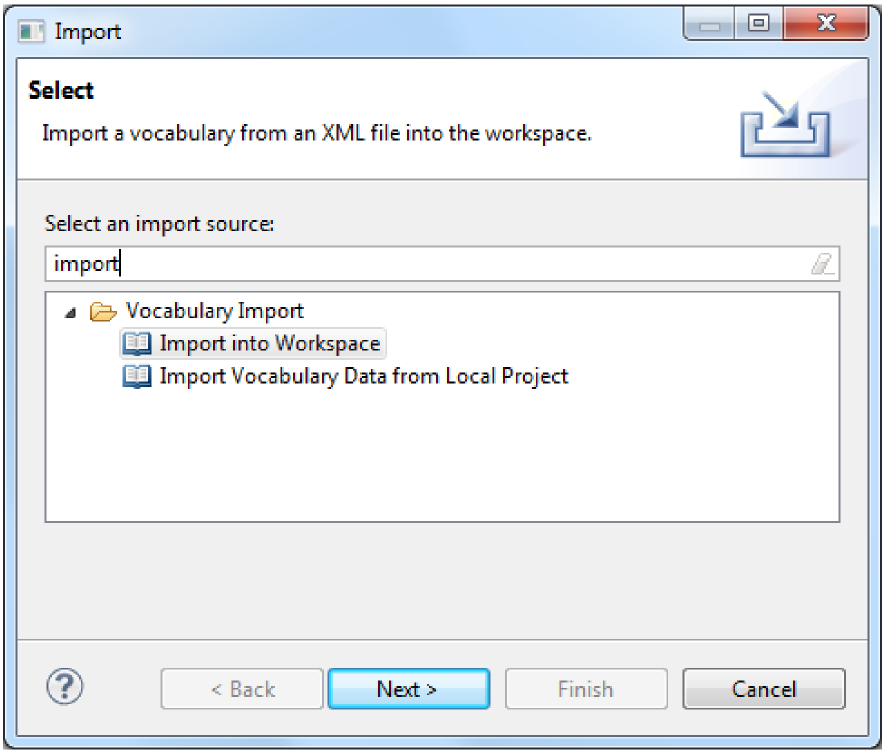

Failure
categorized term
categorized term
categorized term
failure
[termination of the ability of an element (1.32), to perform a function as required]
is a
is a
common cause failure
[failure (1.39) of two or more elements (1.32) of an item (1.69) resulting...]
cascading failure
[failure (1.39) of an element (1.32) of an item (1.69) causing...]
defined by
defined by
defined by
defined by
ISO 26262 - Terms and Definitions

Figure 117 – Example Vocabulary Diagram

Writing vocabularies is a time-consuming process. To save some or all of that work, vocabulary data can be imported from files in a custom XML format. In order to talk about elements of the CCL model in the argumentation, it is not necessary to duplicate the model elements as vocabulary terms. Instead, they can be imported into a vocabulary.



Select

Import a vocabulary from an XML file into the workspace.

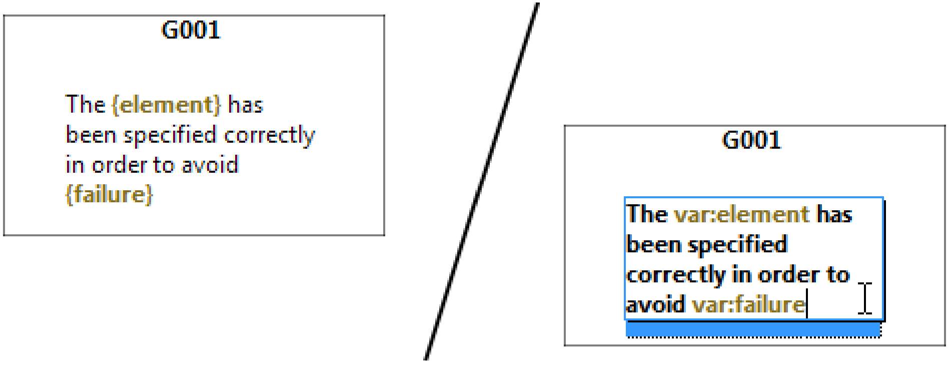
Select an import source:

import

Figure 118 – Vocabulary Import

6.8 Using Vocabularies in the Argument Editor

Terms and term categories from the vocabulary can explicitly be used in the argumentation. In order to do so, some mark-up is required. The mark-up is visible while editing text, otherwise it will not be.



G001

The {element} has been specified correctly in order to avoid {failure}

G001

The var:element has been specified correctly in order to avoid var:failure

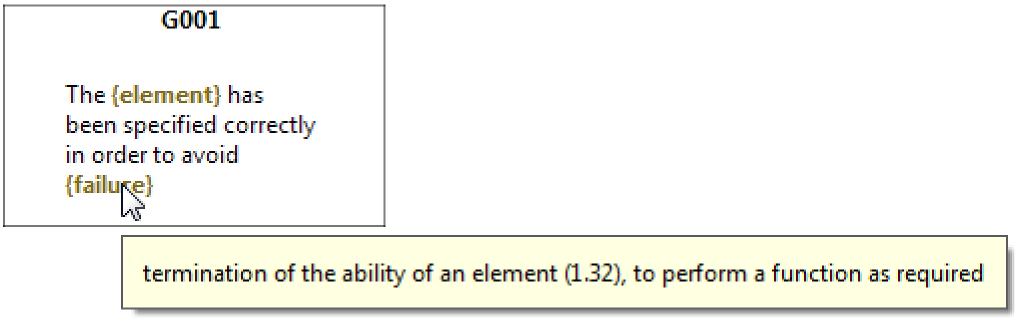
Figure 119 – Mark-up Rendering

One of the following mark-up variants can be used:

- voc:term
- voc:"term" – Usually for terms with spaces or when the sentence ends after the term.
- voc:term|terms – Provide a natural language expression to be rendered instead of the term name, e.g. the plural form of the term. Add quotes if the term or the expression contains spaces.

Categories use the "var" prefix instead of "voc".

Syntax highlighting and tooltips for vocabulary elements are available inside the argumentation editor.



G001

The {element} has been specified correctly in order to avoid {failure}

termination of the ability of an element (1.32), to perform a function as required

Figure 120 – Tooltip

While editing text, pressing Ctrl + Space will display a list of available vocabulary items. The list gets smaller when the user types the starting letters of the item he is looking for. Pressing enter inserts the item at the cursor.

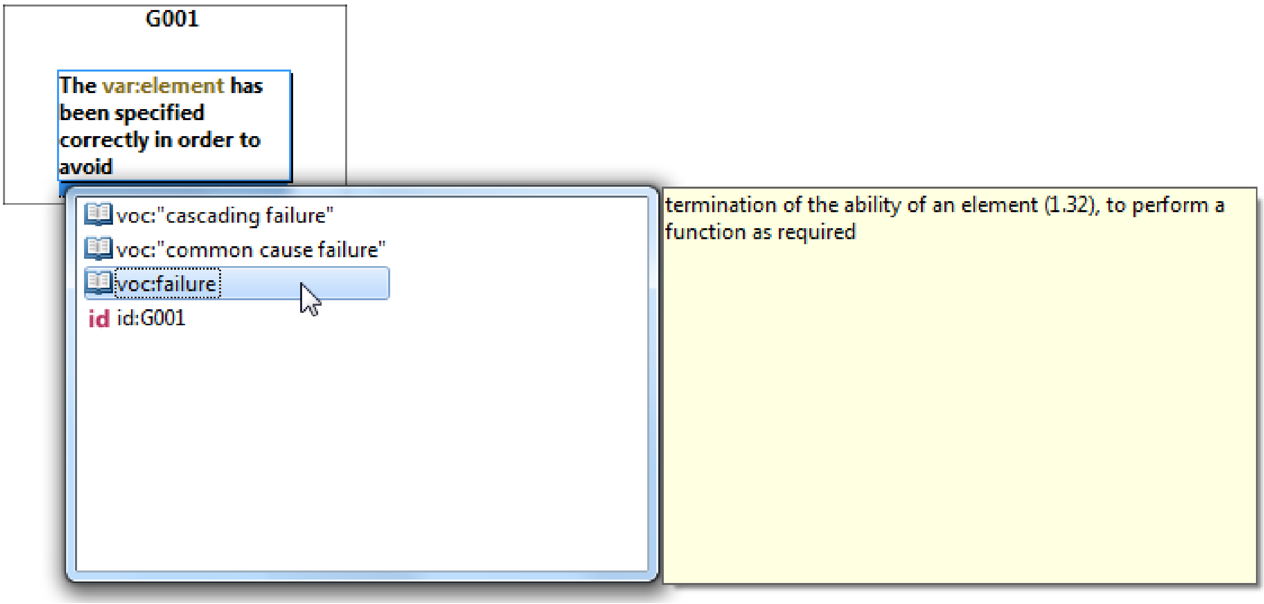

G001
The var:element has been specified correctly in order to avoid
voc:"cascading failure"
voc:"common cause failure"
voc:failure
id id:G001
termination of the ability of an element (1.32), to perform a function as required

Figure 121 – Term Suggestions

6.9 Pattern Instantiation

Argumentation templates are likely to contain text placeholders. Typically, a template containing such a placeholder is inserted in the argumentation from the templates view using drag and drop. If the placeholder is correctly marked as a (general) category from the vocabulary, it can be quickly instantiated with one of the (specific) vocabulary terms from that category. The instantiation action is available in the context menu when right-clicking on the placeholder.

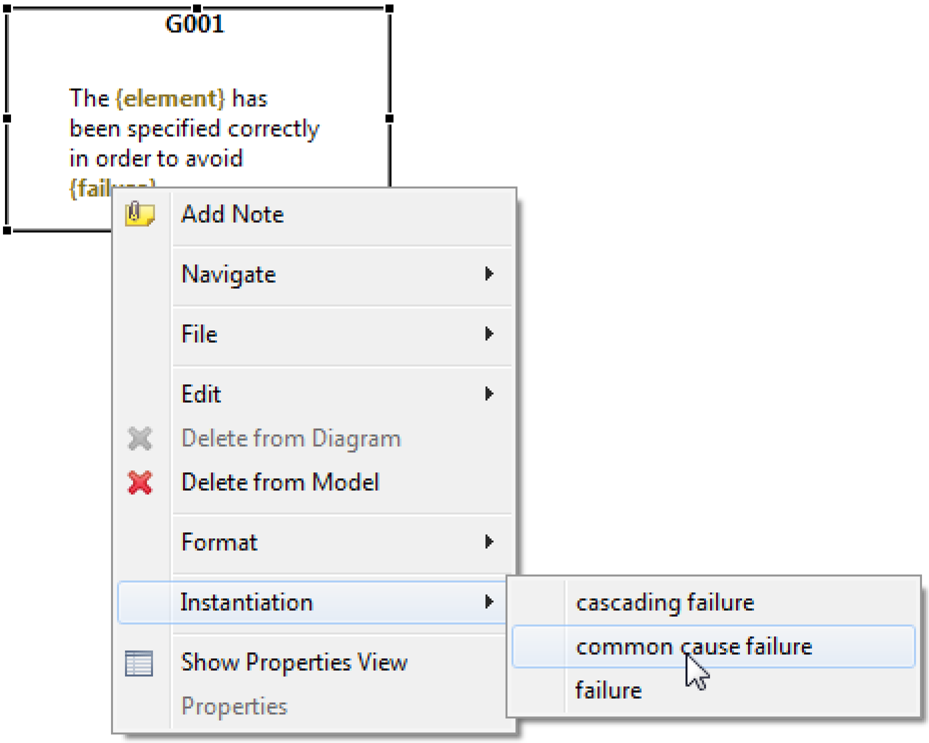


Figure 122 – Pattern Instantiation

6.10 Structured Sentences

Oftentimes, statements inside of safety claims fall into different categories, e.g. risk claims or timing claims. For each of these claim types there is only a small number commonly used sentences if the sentences are appropriately parameterized using general categories from the vocabulary. An example of such a parameterized sentence structure might be:

> The **{risk}** has been mitigated by **{risk mitigation technique}**.

Predefined sentence structures, grouped into a set of claim types such as the risk claim type, offer the user typical statements he likely wants to make in his safety argumentation. They are even more useful when defining argumentation templates because large parts of the template will use parameterized sentences. The Claim Types Editor allows the user to define claim types and structured sentences. Create a new list of claim types under *File -> New -> Other*.

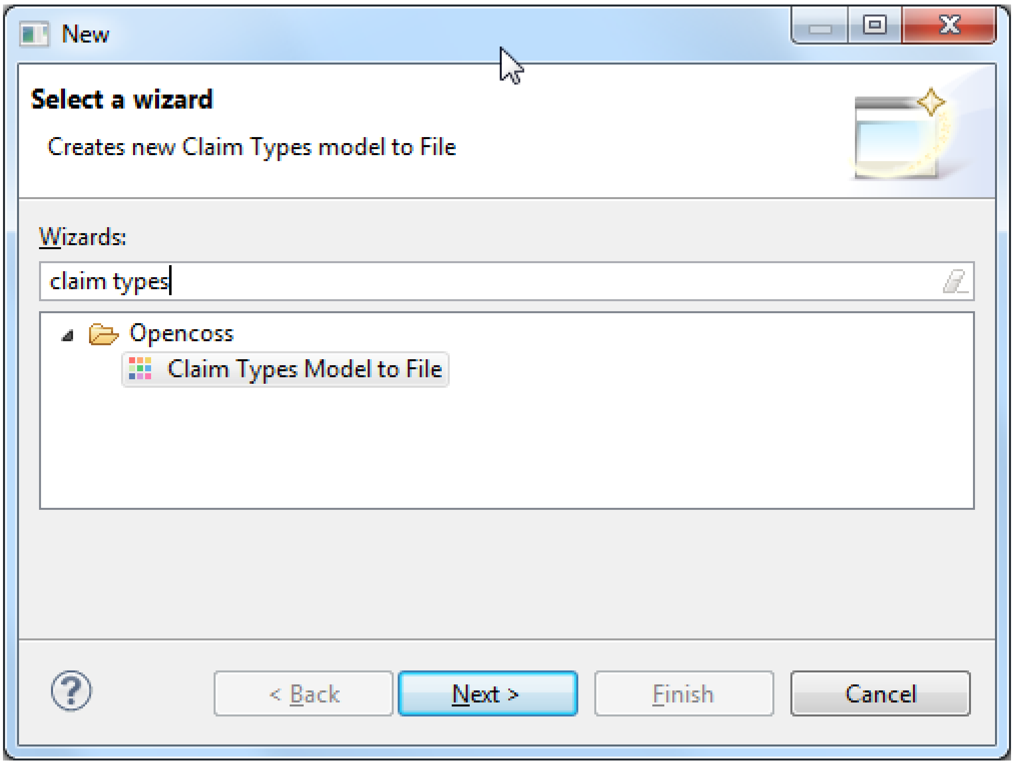
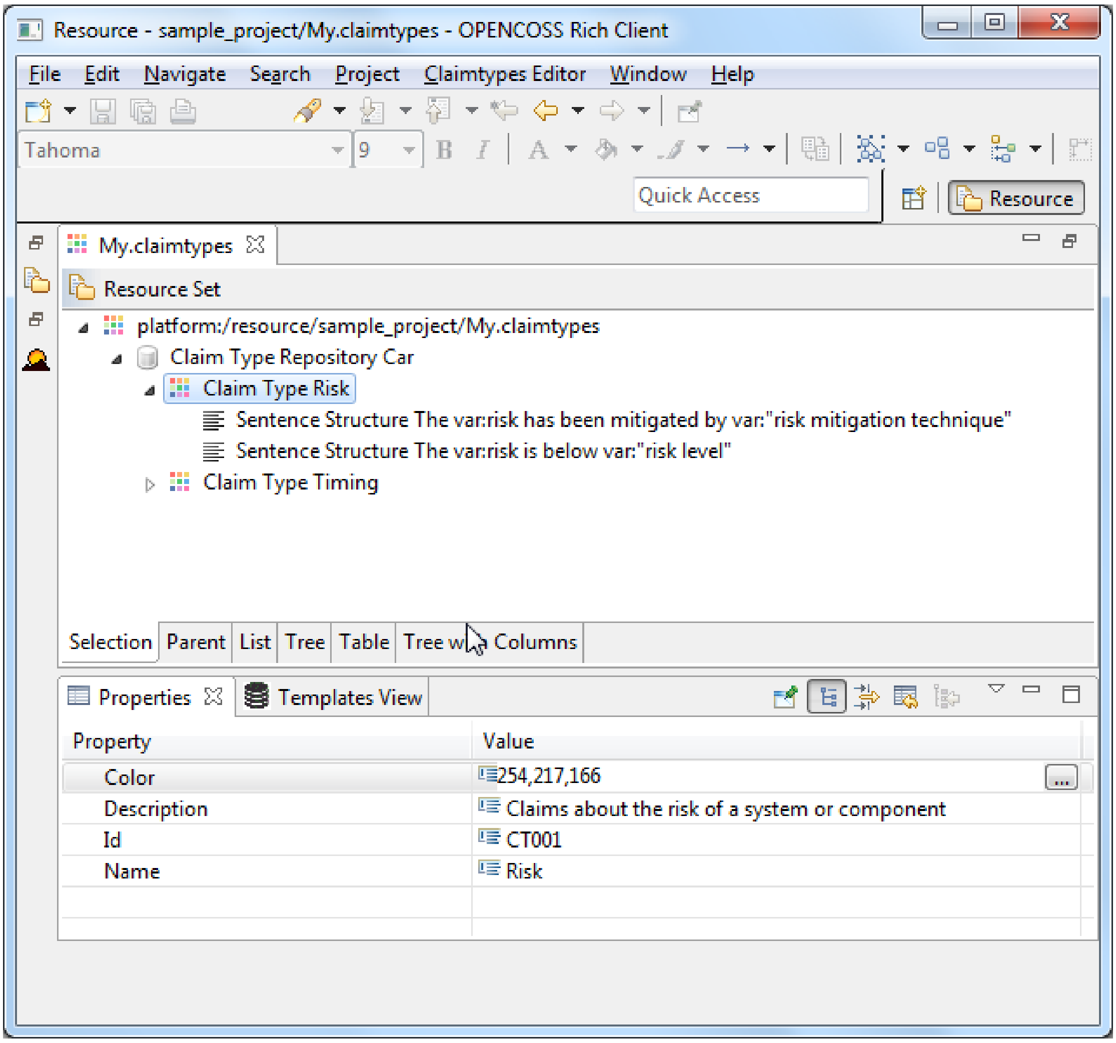


Figure 123 – New Claim Types Editor

In the following example, the sentence structures have been parameterized with categories from the vocabulary like “risk” and “risk mitigation technique”.



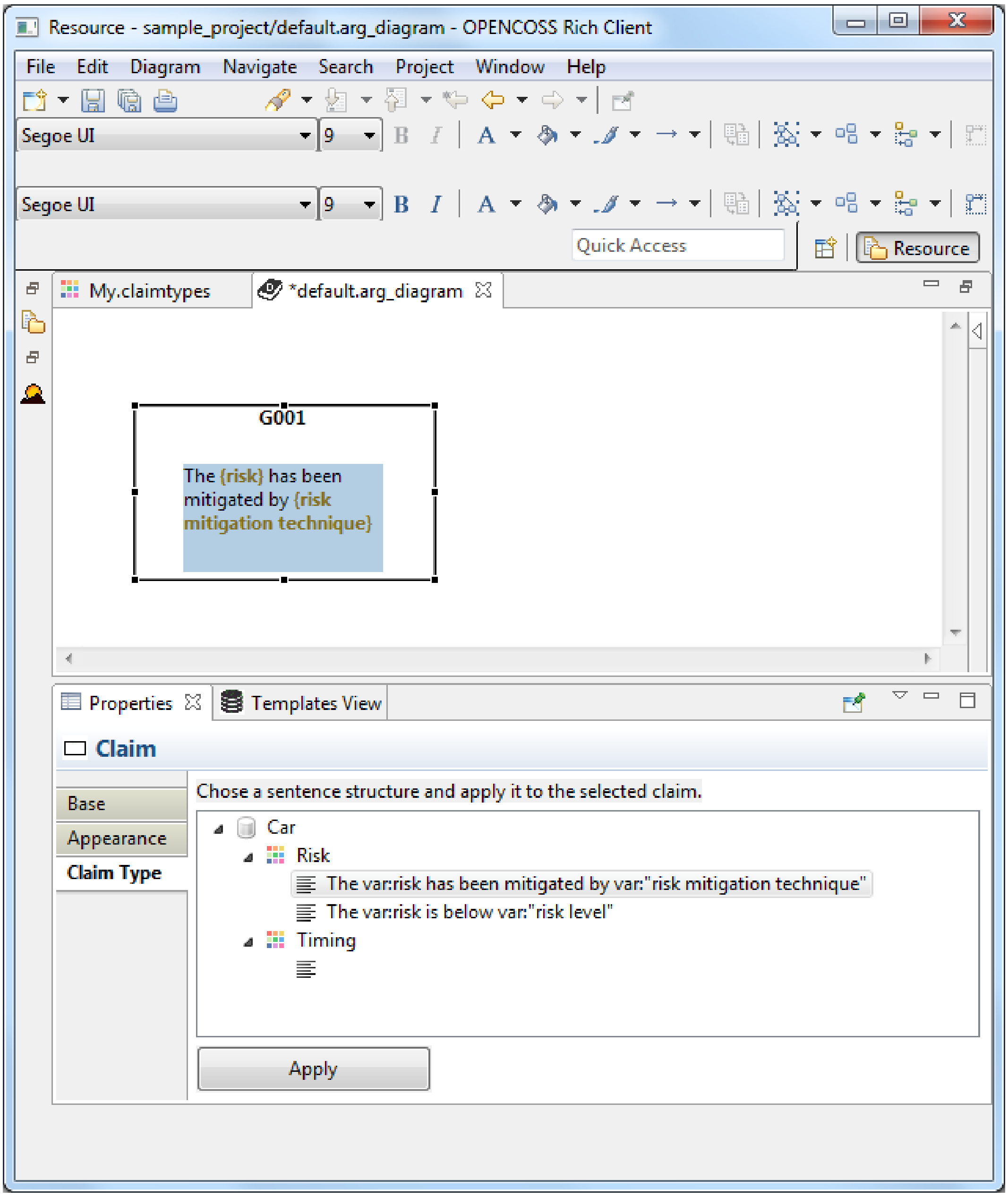
Resource Set

- platform:/resource/sample_project/My.claimtypes
  - Claim Type Repository Car
    - Claim Type Risk
      - Sentence Structure The var:risk has been mitigated by var:"risk mitigation technique"
      - Sentence Structure The var:risk is below var:"risk level"
    - Claim Type Timing

Property	Value
Color	254,217,166
Description	Claims about the risk of a system or component
Id	CT001
Name	Risk

Figure 124 – Claim Type Repository

The properties view of the argumentation editor has been extended to list the available claim types. Select any of the goals, navigate to the appropriate sentence structure and assign the sentence structure to the goal. The color associated with the parent claim type is used to colorize the goal as a visual reminder of the claim type, e.g. blue represents any claim about risk.



The {risk} has been mitigated by {risk mitigation technique}

Chose a sentence structure and apply it to the selected claim.

- Car
  - Risk
    - The var:risk has been mitigated by var:"risk mitigation technique"
    - The var:risk is below var:"risk level"
  - Timing

Figure 125 – Claim Type Tab in the Propeties View

6.11 Printing

The following operations regarding printing are available under the “File” menu.
1. “Print Preview” item: Print preview
2. “Print...” item: Print
3. “Page Setup...” item: Print settings

7 Evidence Management

7.1 Define Artefact Repository Preferences

The first step before creating an Evidence Model is to indicate the SVN Repository configuration information to store the artefact files using the menu Windows→ Preferences

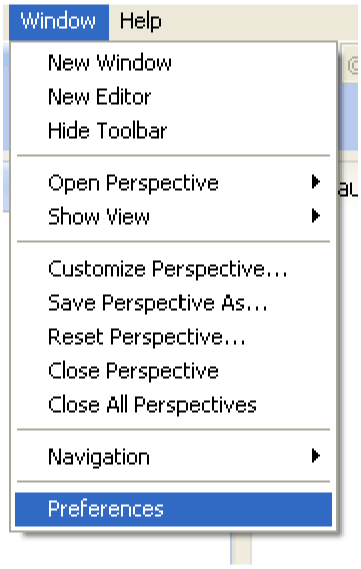
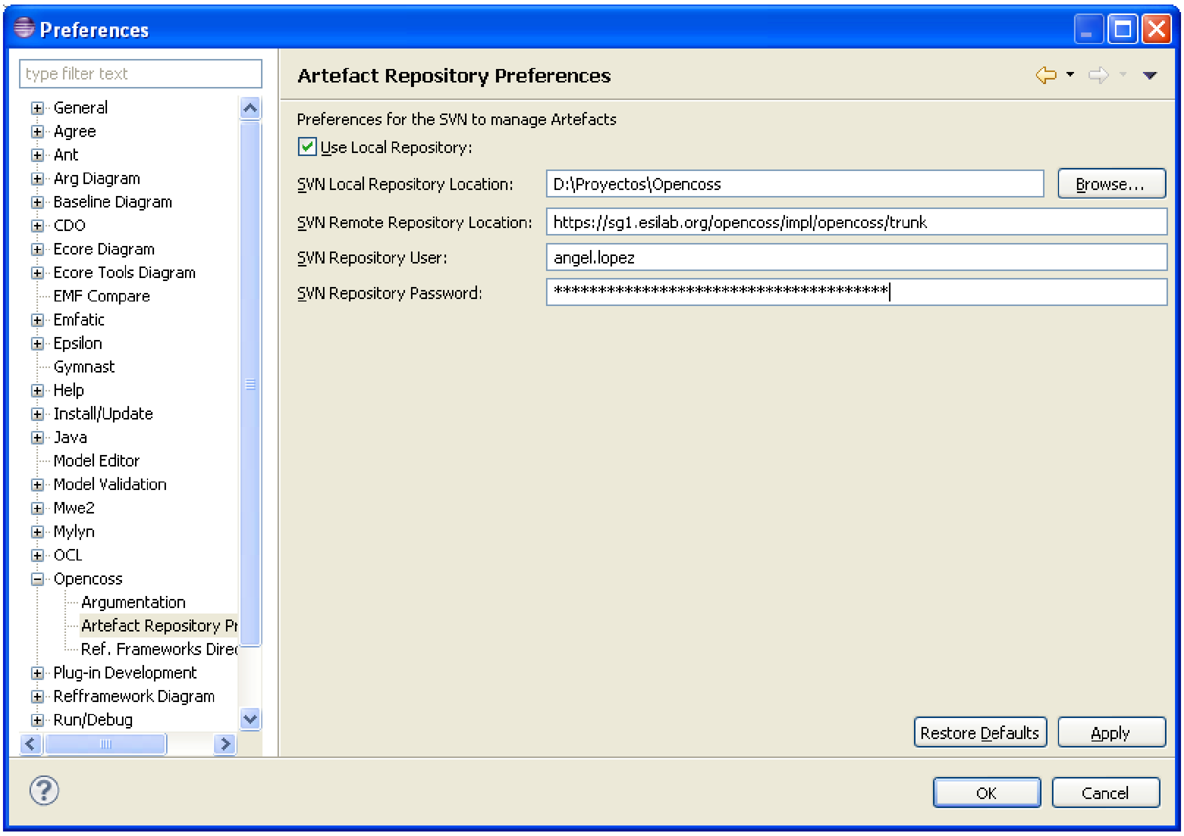


Figure 126 - Preference menu

Then select the Opencoss→ Artefact Repository Preferences category and introduce the information required. If you want to use a local directory as Artefact Repository you have to check the "Use Local Repository" or uncheck it to use a SVN Server, the path of the local folder used as Local repository, the URL of the remote SVN server and the user and password of the SVN server.



Artefact Repository Preferences

Preferences for the SVN to manage Artefacts

☑ Use Local Repository:

SVN Local Repository Location: D:\Proyectos\Opencoss

SVN Remote Repository Location: https://sg1.esilab.org/opencoss/impl/opencoss/trunk

SVN Repository User: angel.lopez

SVN Repository Password: **

Figure 127 - Artefact Repository Preferences

The management of Evidences must be made through the creation of a new model of the type **Evidence Model**.

In order to generate a new Evidence Model, the following steps need to be done:

- First, select the entry of the menu *File -> New -> Other*:

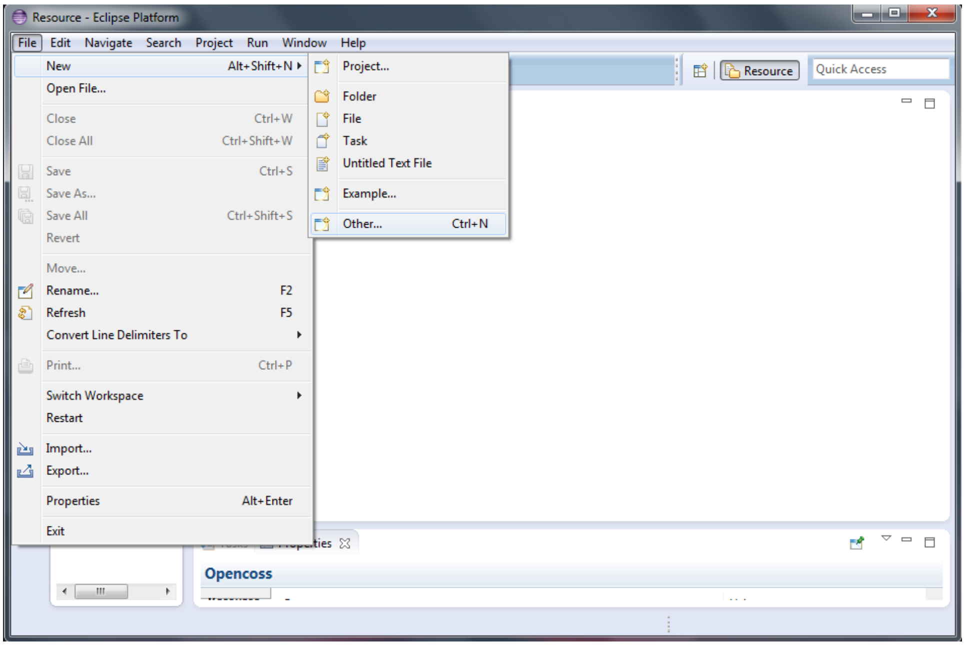
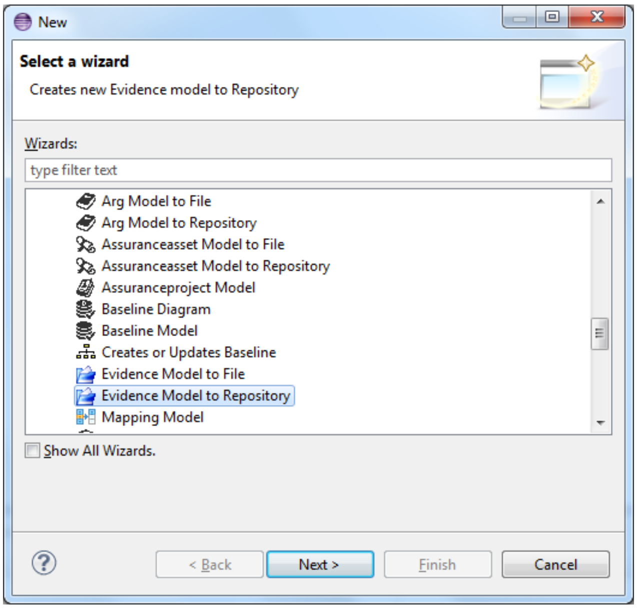


Figure 128 - New Evidence Model menu File -> New -> Other

- Inside the category of the wizard *Opencoss* , select the *Evidence Model* to the Repository and press the *Next* button:



New

Select a wizard

Creates new Evidence model to Repository

Wizards:

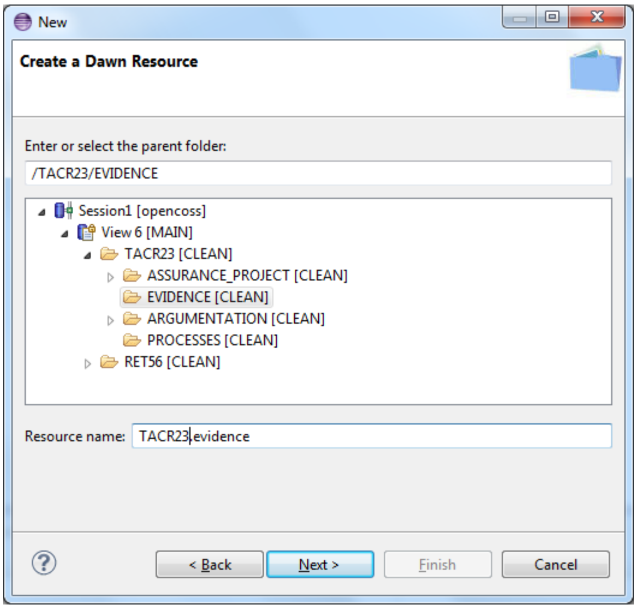
type filter text

- Arg Model to File
- Arg Model to Repository
- Assuranceasset Model to File
- Assuranceasset Model to Repository
- Assuranceproject Model
- Baseline Diagram
- Baseline Model
- Creates or Updates Baseline
- Evidence Model to File
- Evidence Model to Repository
- Mapping Model

□ Show All Wizards.

Figure 129 - New Evidence Model I

- Enter o select the parent folder, the resource name and press the Next button:



New

Create a Dawn Resource

Enter or select the parent folder:

/TACR23/EVIDENCE

- Session1 [opencoss]
  - View 6 [MAIN]
    - TACR23 [CLEAN]
      - ASSURANCE_PROJECT [CLEAN]
      - EVIDENCE [CLEAN]
      - ARGUMENTATION [CLEAN]
      - PROCESSES [CLEAN]
    - RET56 [CLEAN]

Resource name: TACR23evidence

Figure 130 - New Evidence Model II

- And finally, select the “Artefact Model” object to create.

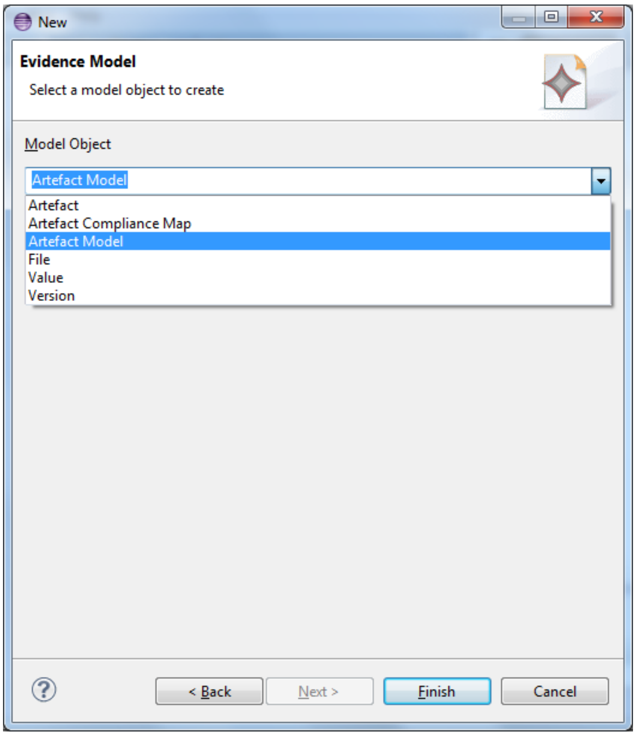
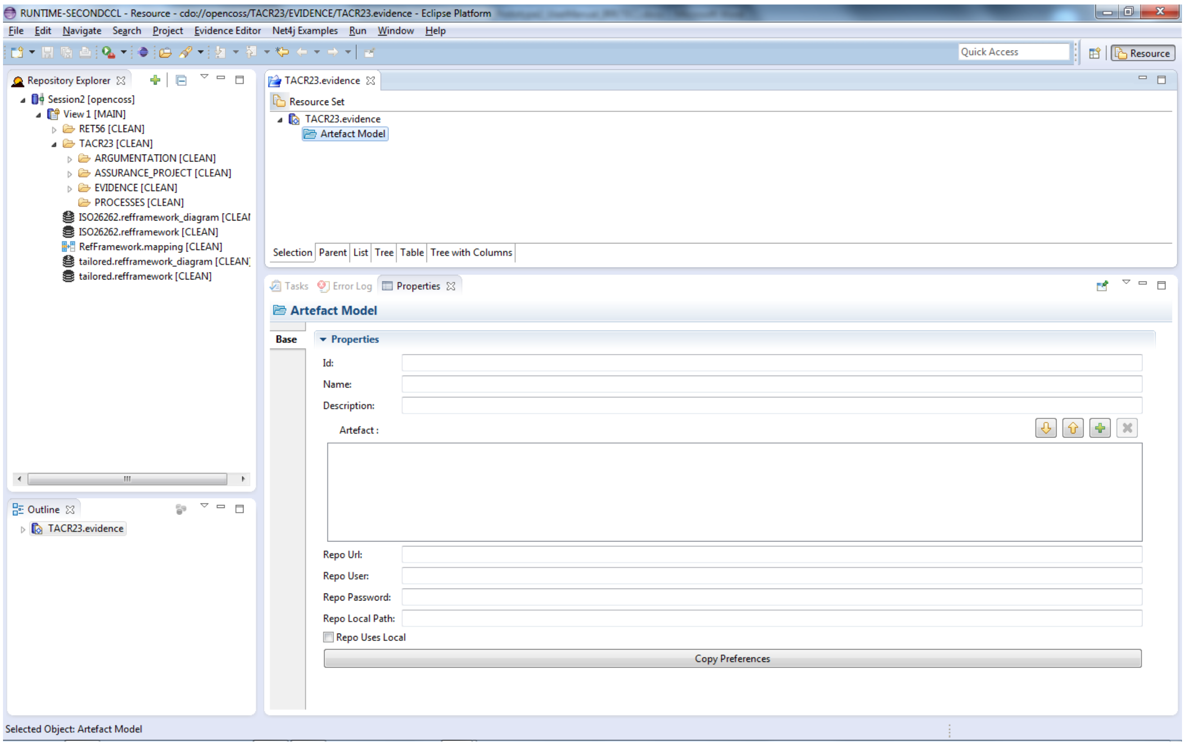


Figure 131 - New Evidence Model III

Once the Evidence Model has been created, the first item is presented to the user.



RUNTIME-SECONDCCL - Resource - cdo://opencoss/TACR23/EVIDENCE/TACR23.evidence - Eclipse Platform
File Edit Navigate Search Project Evidence Editor Net4j Examples Run Window Help
Quick Access
Resource
Repository Explorer
Session2 [opencoss]
View 1 [MAIN]
RET56 [CLEAN]
TACR23 [CLEAN]
ARGUMENTATION [CLEAN]
ASSURANCE_PROJECT [CLEAN]
EVIDENCE [CLEAN]
PROCESSES [CLEAN]
ISO26262.refframework_diagram [CLEAI
ISO26262.refframework [CLEAN]
RefFramework.mapping [CLEAN]
tailored.refframework_diagram [CLEAN]
tailored.refframework [CLEAN]
Outline
TACR23.evidence
TACR23.evidence
Resource Set
TACR23.evidence
Artefact Model
Selection Parent List Tree Table Tree with Columns
Tasks Error Log Properties
Artefact Model
Base
Properties
Id:
Name:
Description:
Artefact :
Repo Url:
Repo User:
Repo Password:
Repo Local Path:
□ Repo Uses Local
Copy Preferences
Selected Object: Artefact Model

Figure 132 - Evidence Model

The "Copy Preferences" button will copy the Artefact Repository Preferences data to this model and will be saved in the model to be used to store the Artefact files of this evidence model. If this information is empty, then the data specified in the Artefact Repository Preferences will be used to store the artifact files.

7.2 Artefact Definition

7.2.1 Add an artefact definition

It is possible to add artefacts definition to an artefact model in two ways:

- One way, select the artefact model and press the button

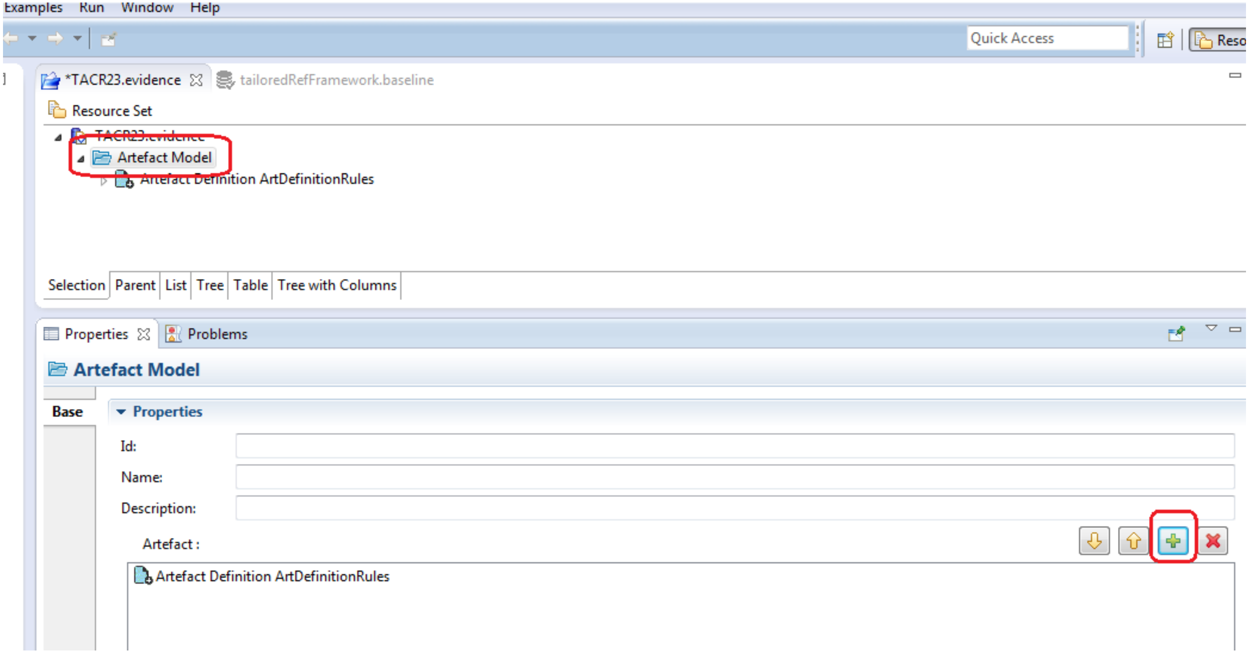


Figure 133 - Add New Artefact Definition (I)

- Another way, click on the branch Artefact Model, press the right mouse button and select the contextual menu New Child –> Artefact Definition.

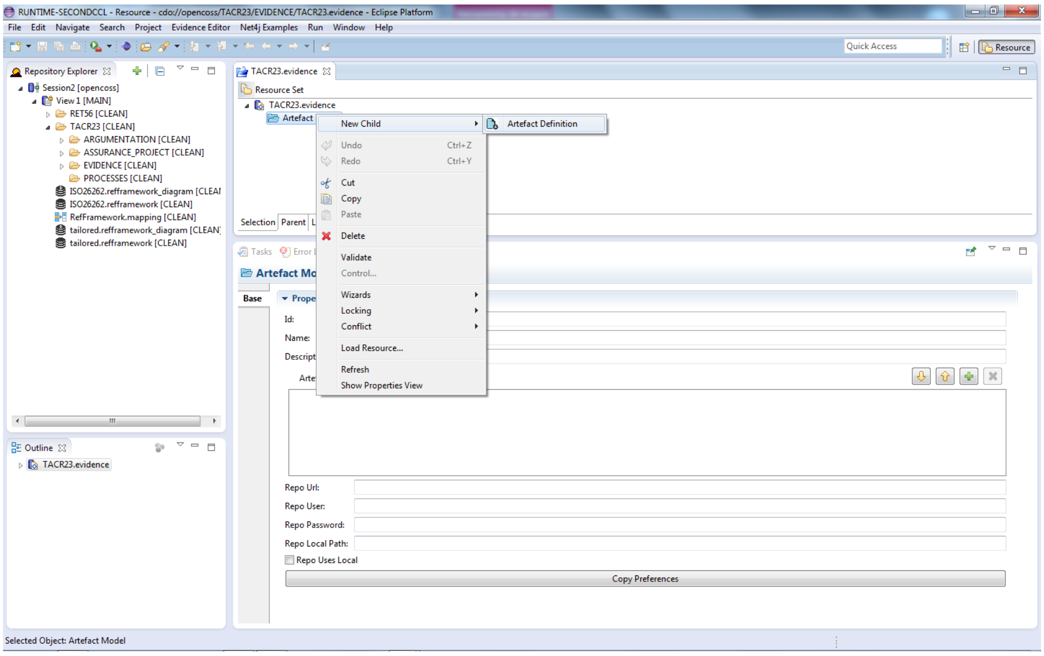
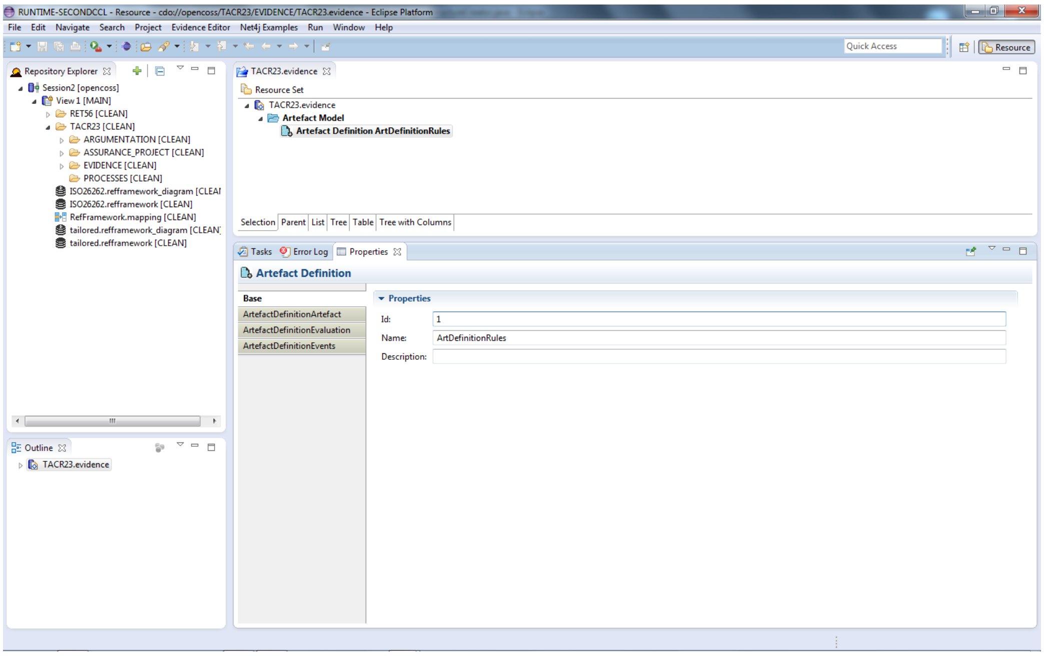


Figure 134 - Add New Artefact Definition (II)

In the properties zone, the framework presents several fields to describe the new Artefact Definition divided in tabs:

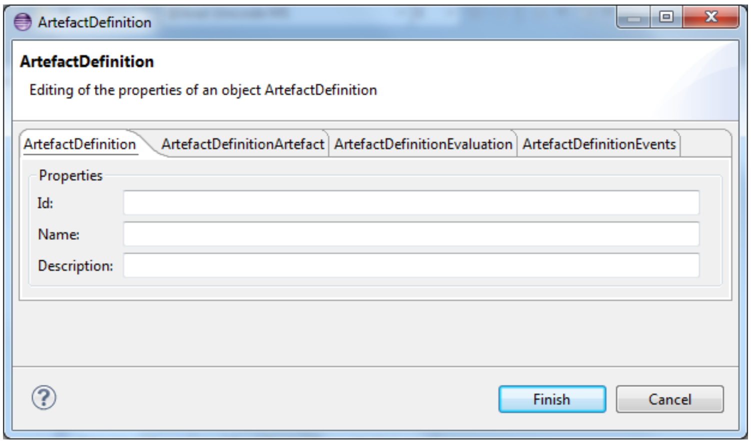


Id: 1

Name: ArtDefinitionRules

Description:

Figure 135 - Artefact Definition Description (I)



ArtefactDefinition
ArtefactDefinition
Editing of the properties of an object ArtefactDefinition
ArtefactDefinition
ArtefactDefinitionArtefact
ArtefactDefinitionEvaluation
ArtefactDefinitionEvents
Properties
Finish
Cancel

Id:

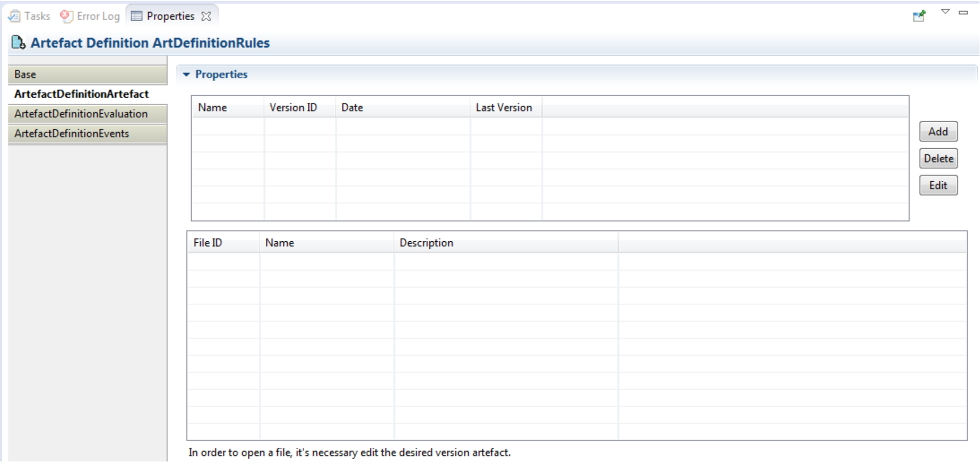
Name:

Description:

Figure 136 - Artefact Definition Description (II)

1. Artefact Definition (base)
   - Id: Artefact Definition identifier.
   - Name: Artefact Definition name.
   - Description: Artefact Definition description.
2. Artefact Definition Artefact
   - Name: Artefact name. This field is read-only.
   - Version ID: Identifier of the artefact version.
   - Date: Date of the artefact version.
   - Last Version: This field shows what artefact is the version in use.
   - File ID: Identifier of the file associated with the artefact.
   - Name: Name of the file associated with the artefact.

- Description: Description of the file associated with the artefact.



In order to open a file, it's necessary edit the desired version artefact.

Figure 137 - Description Artefact Definition Artefact

3. Artefact Definition Evaluation
   - References to the assurance asset evaluations that specify the outcome of evaluating the artefact.

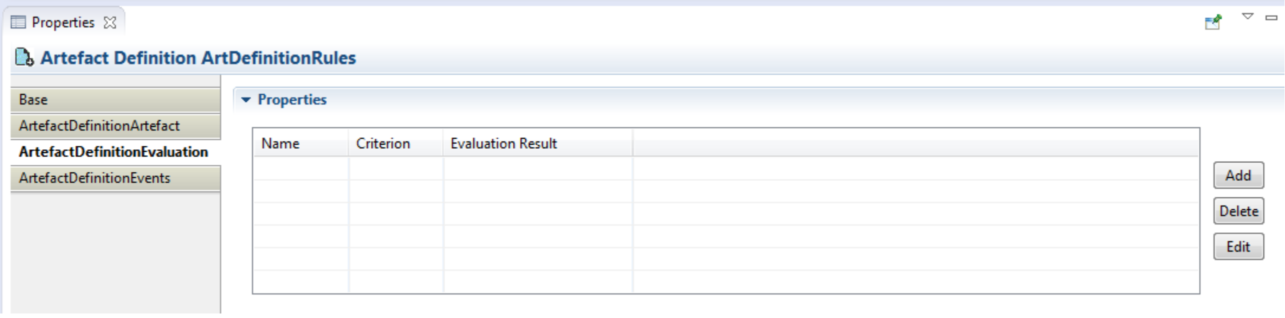

Properties
Artefact Definition ArtDefinitionRules
Base
ArtefactDefinitionArtefact
ArtefactDefinitionEvaluation
ArtefactDefinitionEvents
Properties
Name
Criterion
Evaluation Result
Add
Delete
Edit

Figure 138 - Description Artefact Definition Evaluation

4. Artefact Definition Events:
   - References to the assurance asset events of which the lifecycle of the artefact consists.

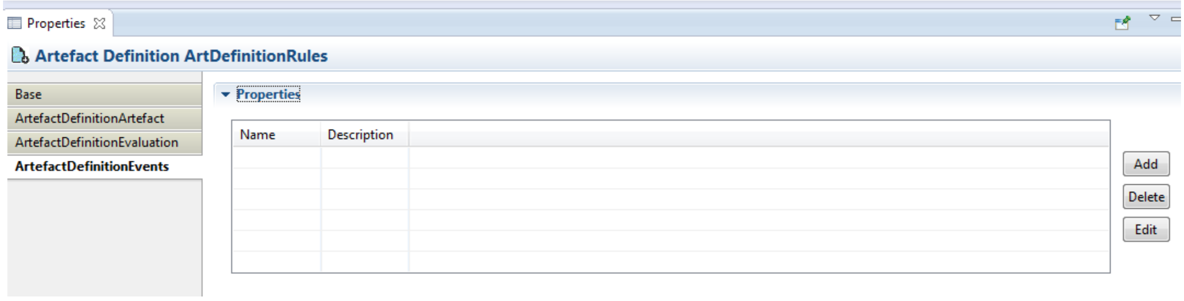

Properties
Artefact Definition ArtDefinitionRules
Base
ArtefactDefinitionArtefact
ArtefactDefinitionEvaluation
ArtefactDefinitionEvents
Properties
Name
Description
Add
Delete
Edit

Figure 139 - Description Artefact Definition Events

7.2.2 Delete Artefact Definition.

To delete an artefact definition:

- Select the artefact definition, press the right mouse button and select the contextual menu *Delete:*

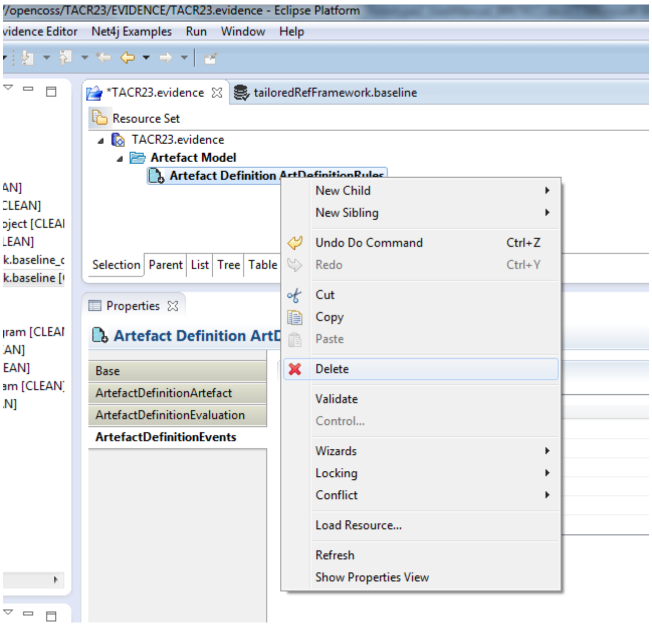


Figure 140 - Delete Artefact Definition (I)

- Or, select the artefact model, select the artefact definition model to delete and press the button ✖ :

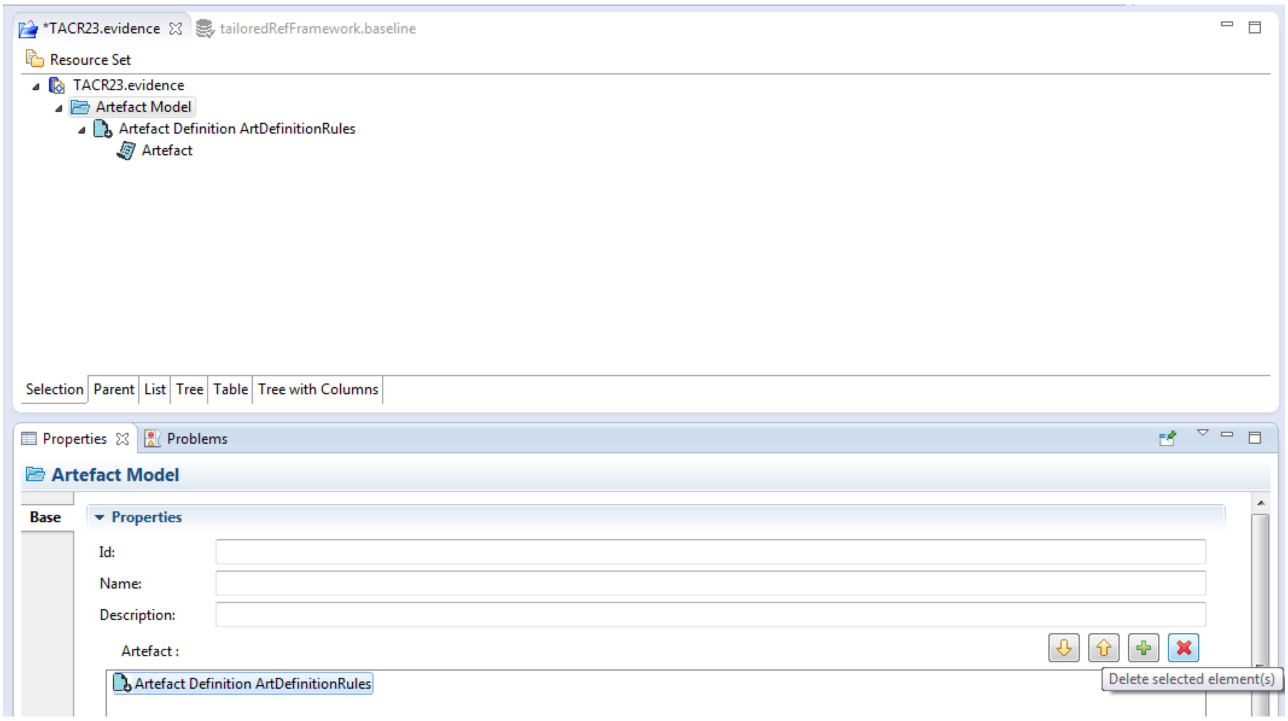

*TACR23.evidence
tailoredRefFramework.baseline
Resource Set
TACR23.evidence
Artefact Model
Artefact Definition ArtDefinitionRules
Artefact
Selection Parent List Tree Table Tree with Columns
Properties
Problems
Artefact Model
Base
Properties
Id:
Name:
Description:
Artefact :
Artefact Definition ArtDefinitionRules
Delete selected element(s)

Figure 141 - Delete Artefact Definition (II)

7.3 Artefact

7.3.1 Add an artefact

It is possible to add artefacts to an artefact definition in two ways:

- Select the artefact definition, press the right button of the mouse and select the contextual menu *New Child –> Artefact*

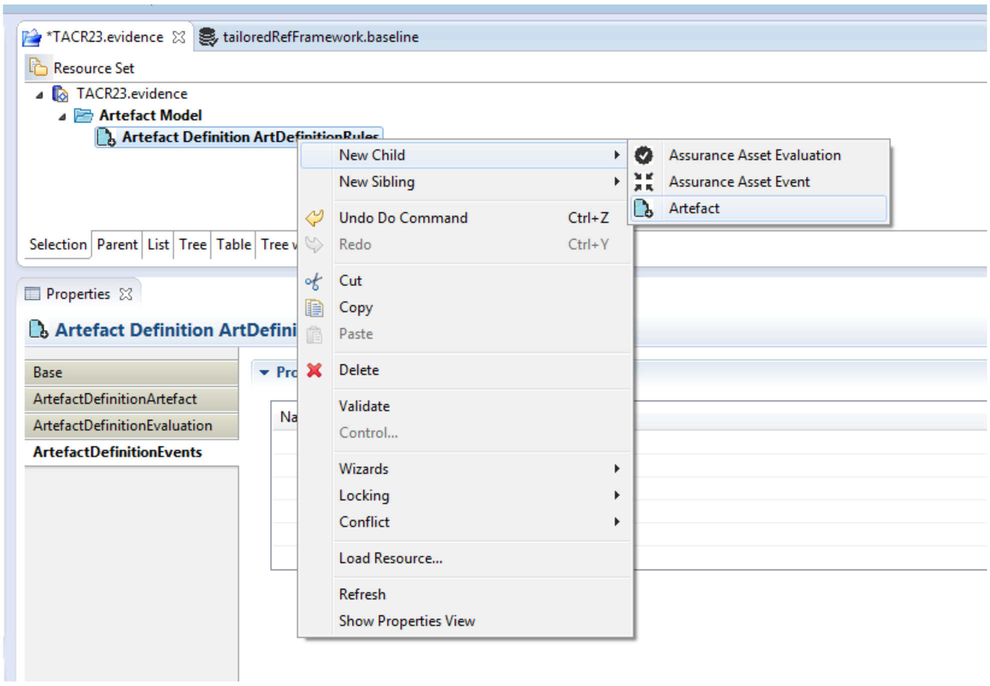


Figure 142 - Add New Artefact (I)

- Or, select the artefact definition, select the Artefact Definition Artefact tab Properties, and press the button *Add*

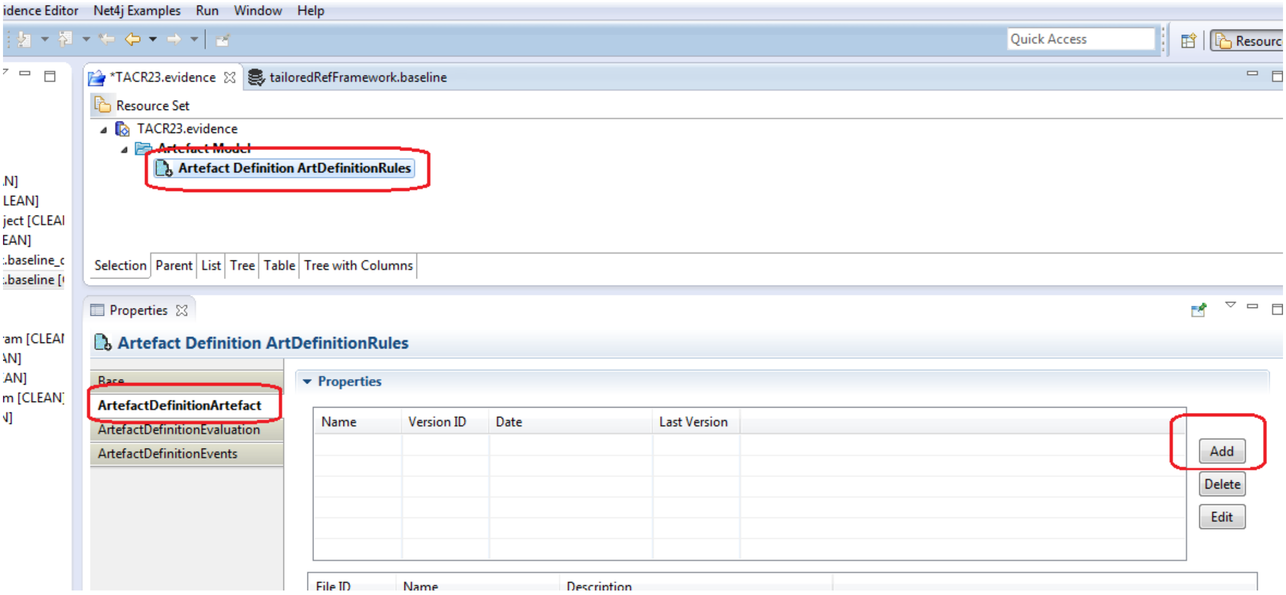
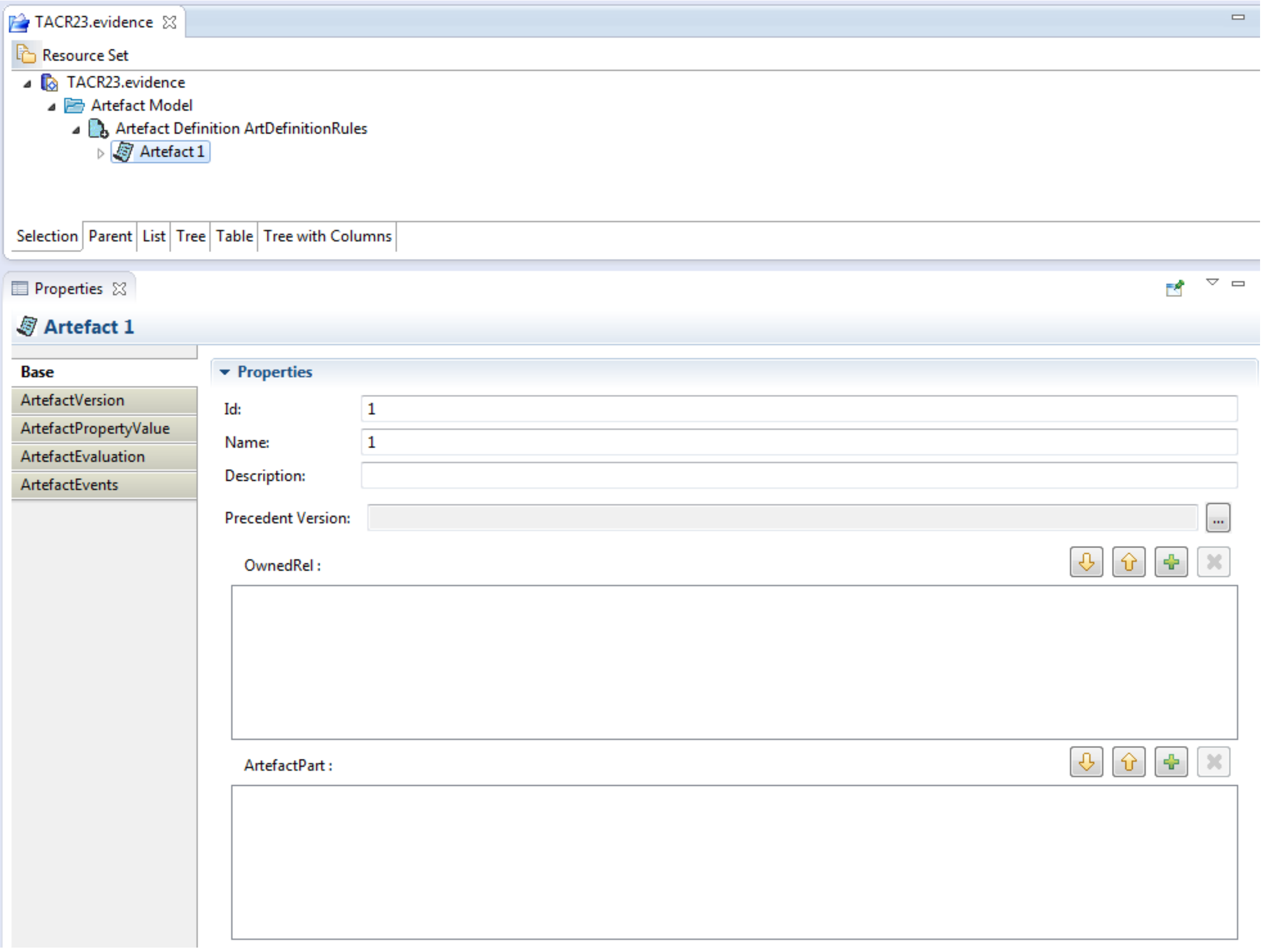


Figure 143 - Add New Artefact (II)

When user modifies one Artefact, the system automatically adds to it an AssuranceAssetEvent of type Modification.

In the properties zone, the framework presents several fields to describe the new Artefact divided in tabs:



Id: 1

Name: 1

Description:

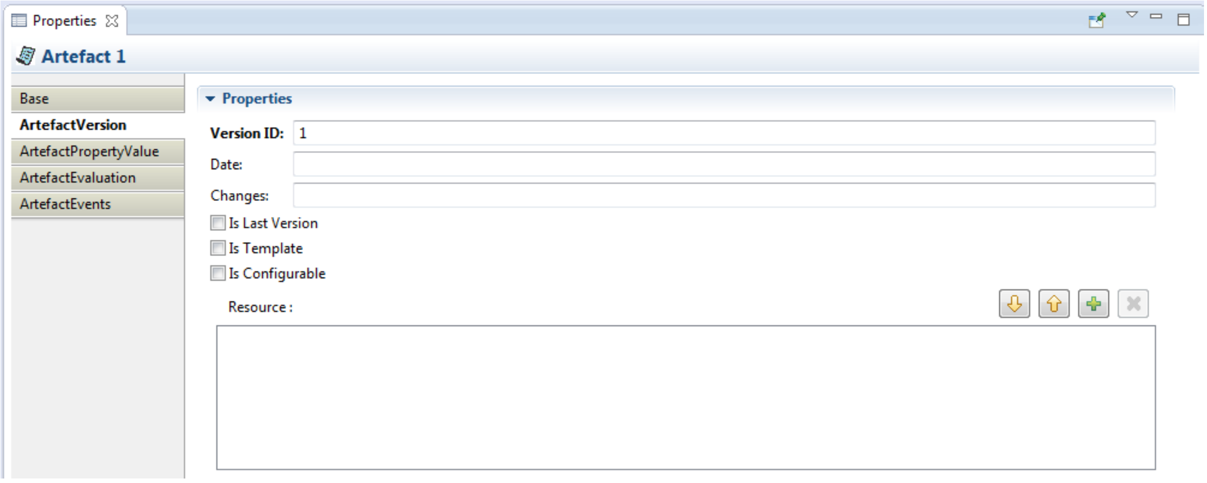
Precedent Version:

OwnedRel :

ArtefactPart :

Figure 144 - Artefact Description

1. Artefact Definition (base)
   - Id: Artefact Definition identifier.
   - Name: Artefact Definition name.
   - Description: Artefact Definition description.
2. Artefact Version
   - Version ID: Identifier of the artefact version.
   - Date: Date of the artefact version.
   - Changes: Changes make in the artefact version.
   - Last Version: This field shows what artefact is the version in use.
   - Is Template: Check if the artefact is a template.
   - Is Configurable: Check if the artefact is configurable.
   - Resource: List of resources associated to the artefact,



Properties

Artefact 1

Base

ArtefactVersion

ArtefactPropertyValue

ArtefactEvaluation

ArtefactEvents

Properties

Version ID: 1

Date:

Changes:

□ Is Last Version

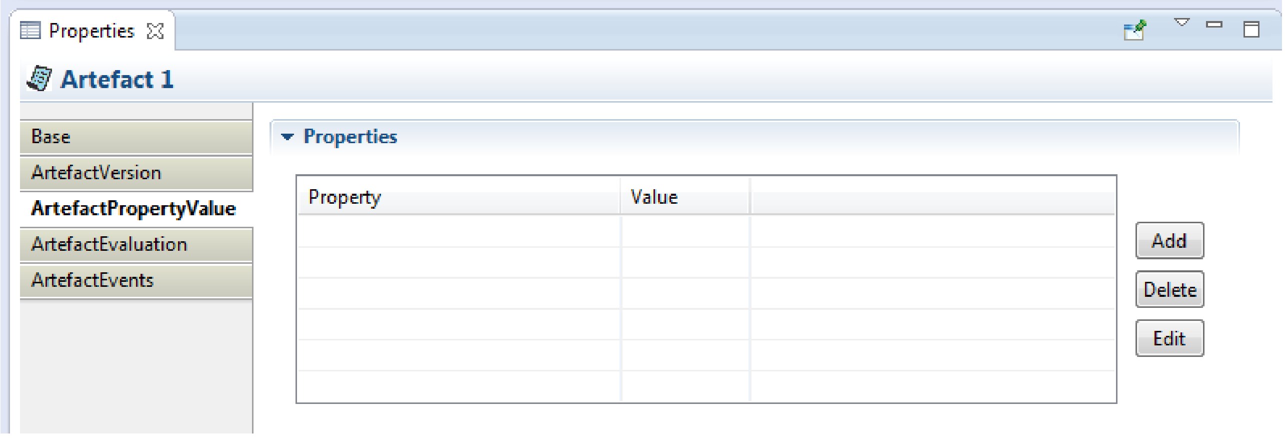
□ Is Template

□ Is Configurable

Resource :

Figure 145 - Description Artefact Version

3. Artefact Property Value
   - Property: Property name.
   - Value: Property value.



Properties

Artefact 1

Base

ArtefactVersion

ArtefactPropertyValue

ArtefactEvaluation

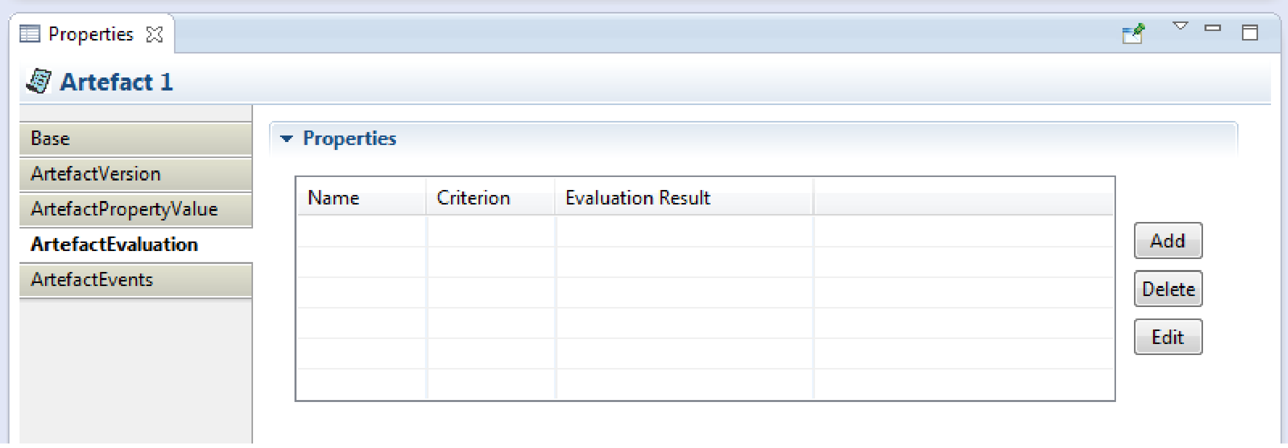
ArtefactEvents

Properties

Property	Value

Figure 146 - Description Artefact Property Value

4. Artefact Evaluation
   - Evaluation: References to the assurance asset evaluations that specify the outcome of evaluating the artefact. When a user introduces Evaluation information to an Artefact, and AssuranceAssetEvent of type Evaluation is added automatically to the Artefact.



Properties

Artefact 1

Base

ArtefactVersion

ArtefactPropertyValue

ArtefactEvaluation

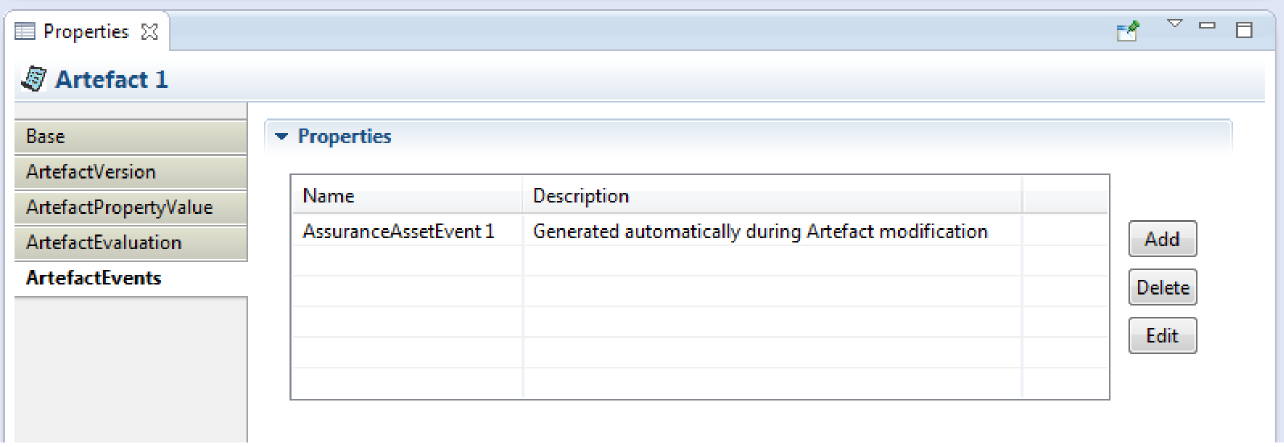
ArtefactEvents

Properties

Name	Criterion	Evaluation Result

Figure 147 - Description Artefact Evaluation

5. Artefact Events
   - LifecycleEvent: References to the assurance asset events of which the lifecycle of the artefact consists.



Name	Description
AssuranceAssetEvent 1	Generated automatically during Artefact modification

Figure 148 - Description Artefact Events

When adding child Artefact to other Artefact, it's created automatically ArtefactRel information with modificationEffect=MODIFY and revocationEffect=MODIFY with source= parentArtefact and target=child Artefact.

7.3.2 Delete an artefact.

To delete an artefact:

- Selecting the artefact, press the right mouse button and select the contextual menu *Delete*.

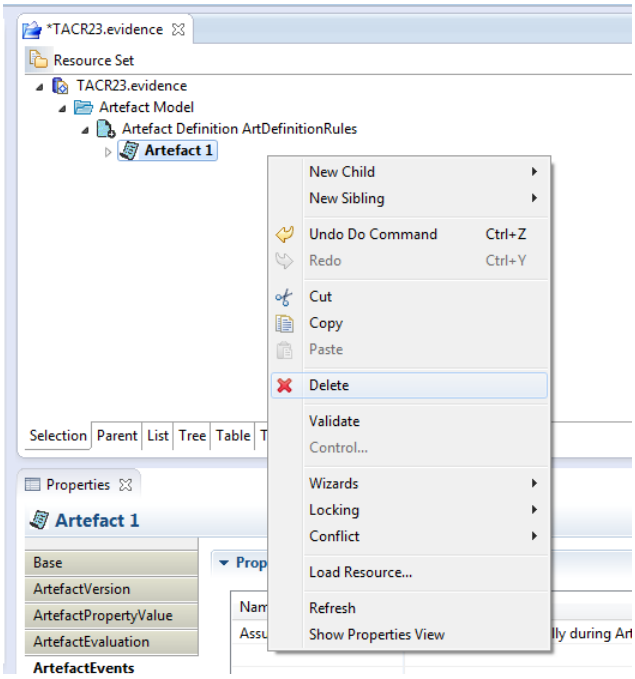
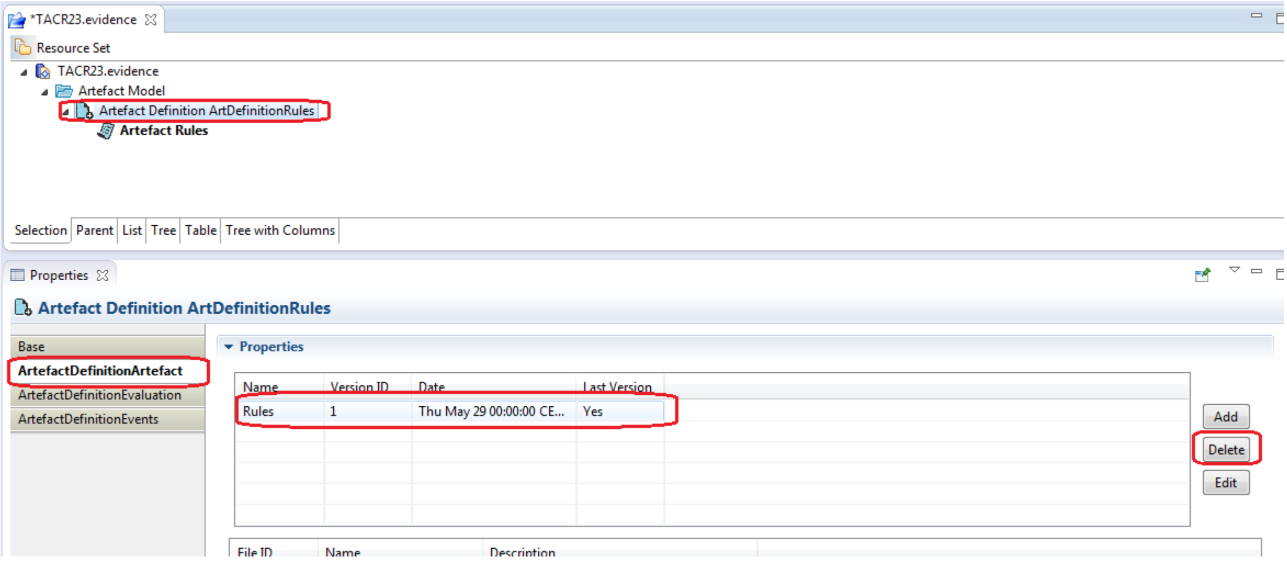


Figure 149 - Delete Artefact I.

- Or select the branch *Artefact Definition that contains the artefact to delete, select the ArtefactDefinitionArtefact tab,* select the artefact and press the button *Delete*



Name	Version ID	Date	Last Version
Rules	1	Thu May 29 00:00:00 CE...	Yes

Figure 150 - Delete Artefact II.

7.4 Artefact Resource

7.4.1 Add an artefact resource to an artefact

Once selected the artefact:

- Press the right mouse button and select the contextual menu New Child -> Resource to bring up the Artefact File properties.

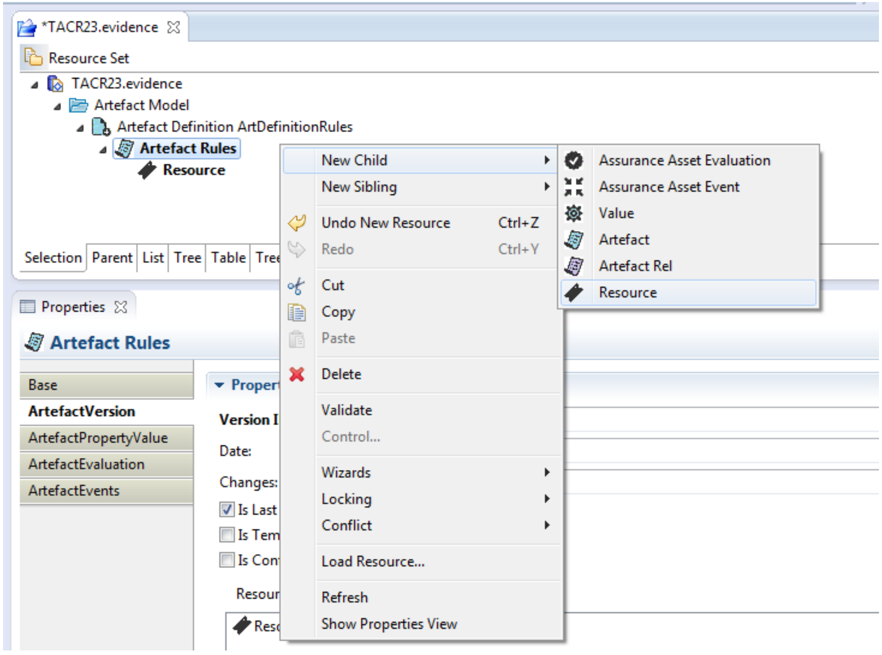
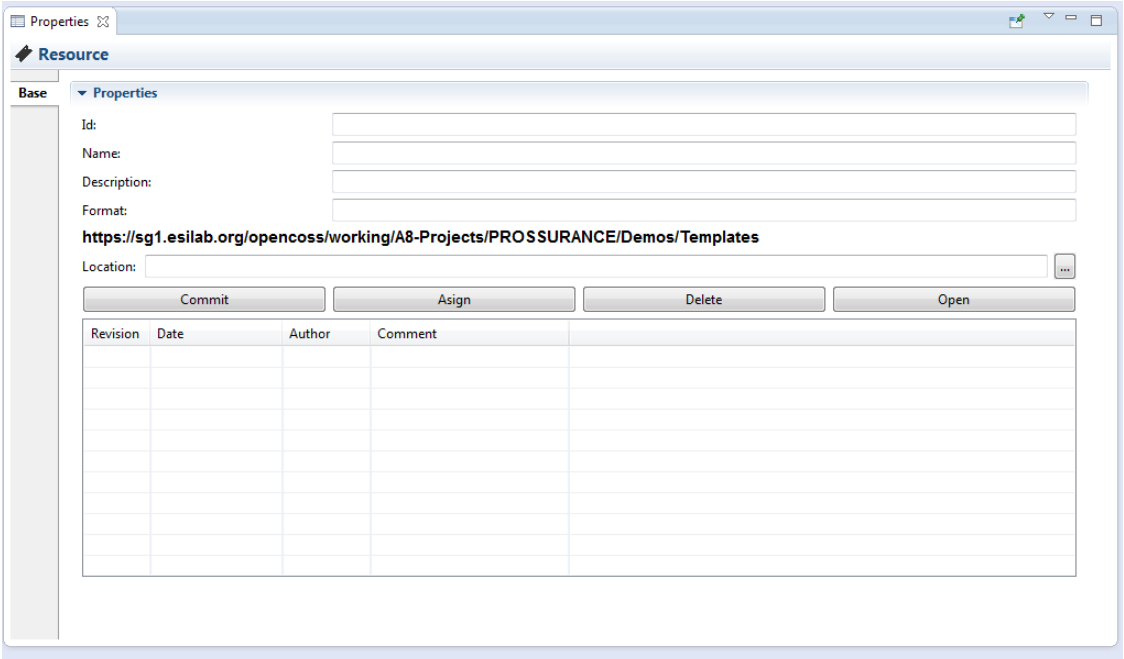


Figure 151 - Add Artefact Resource I



Properties ☒

Resource

Base

Properties

Id:

Name:

Description:

Format:

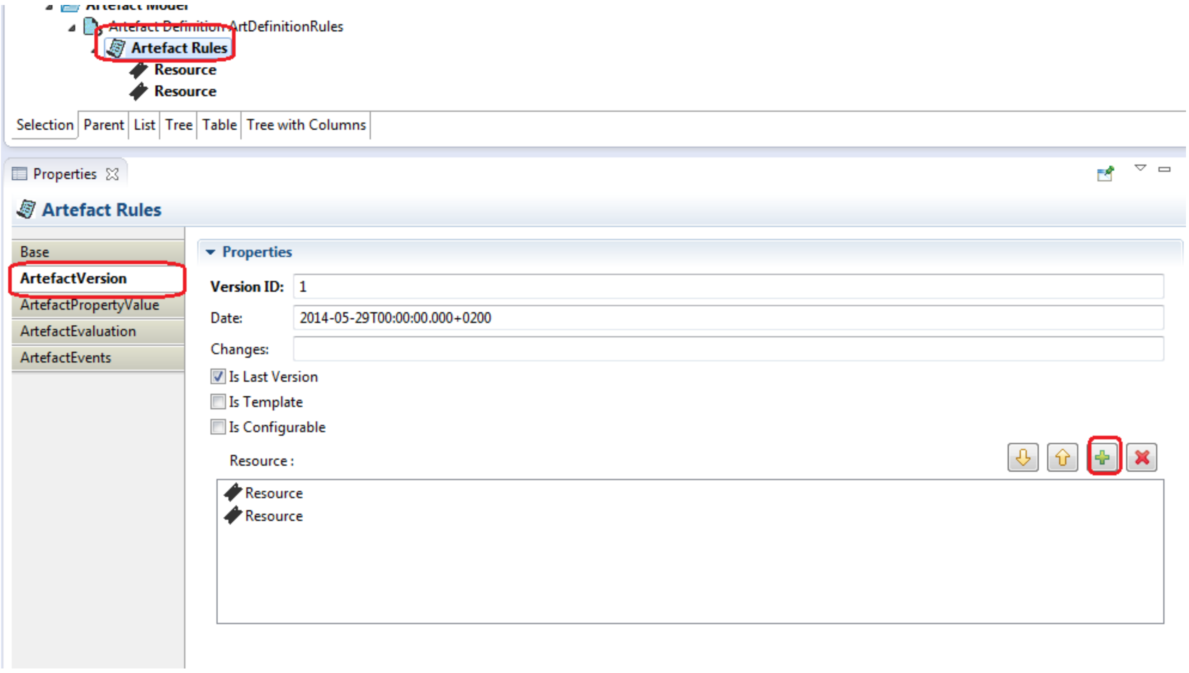
https://sg1.esilab.org/opencoss/working/A8-Projects/PROSSURANCE/Demos/Templates

Location:

Revision	Date	Author	Comment

Figure 152 - Resource properties

- Or, select the Artefact Version tab and press the button ✚.



Version ID: 1

Date: 2014-05-29T00:00:00.000+0200

Changes:

☑ Is Last Version

☐ Is Template

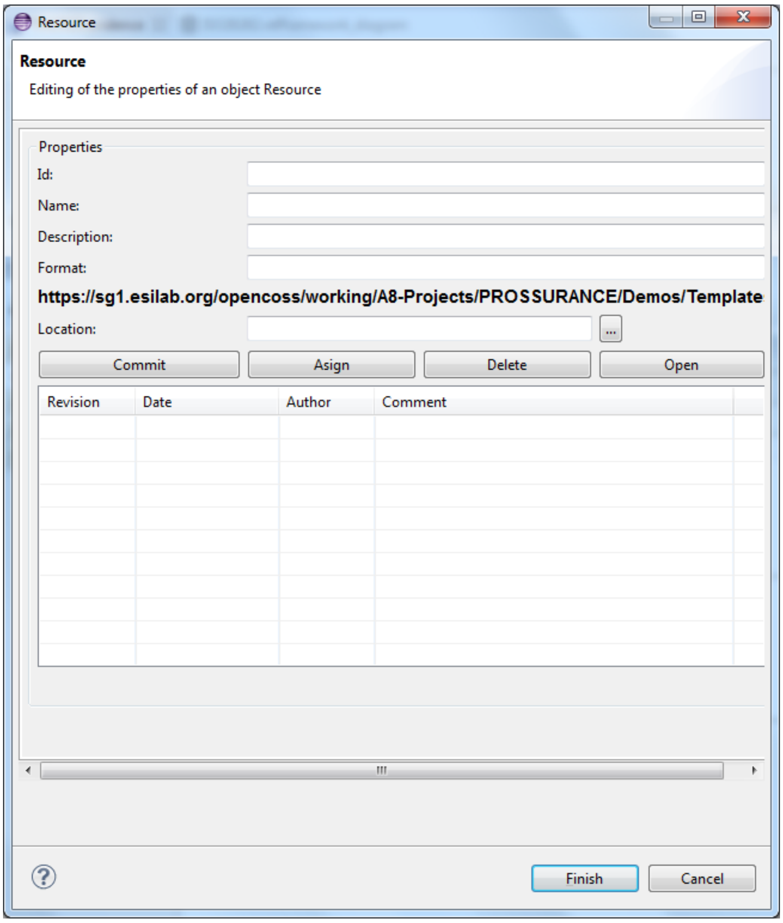
☐ Is Configurable

Resource :

Resource

Resource

Figure 153 - Add Artefact Resource II



Resource

Editing of the properties of an object Resource

https://sg1.esilab.org/opencoss/working/A8-Projects/PROSSURANCE/Demos/Template

Figure 154 - Resource dialog box

In case of using a Local Repository to add the file, press the button Location or Assign, and select the file that will be added to the artefact resource from the local drive. The URL of the repository will be displayed in bold.

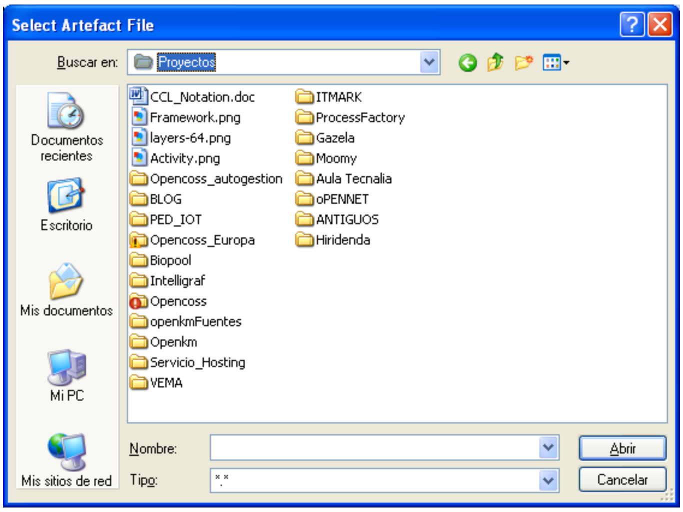


Figure 155 - Select Artefact from the local drive.

1. In case of using a Remote Repository to add the file, press the button Location to select the file that will be added to the artefact resource from the local drive and after press the "Commit" button to upload it to the SVN server. If the already file exists in the SVN Server use the "Assign"

button to select and assign it to the artifact version. Finally the SVN history of the file will be displayed in the table below.

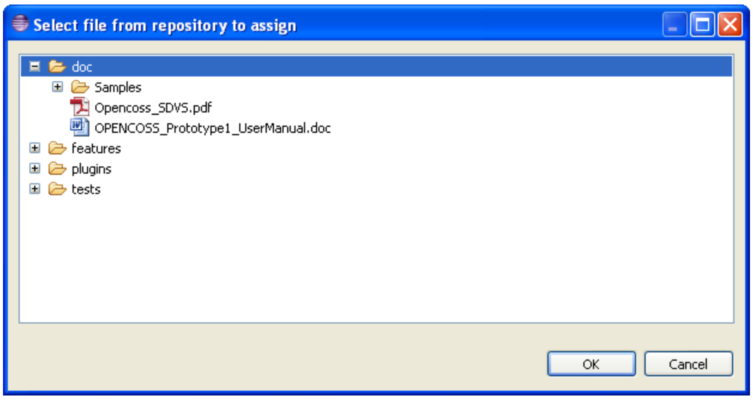
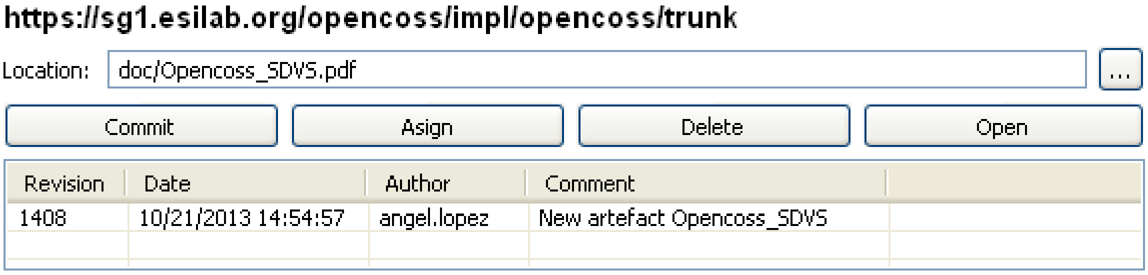

Select file from repository to assign
doc
Samples
Opencoss_SDVS.pdf
OPENCOSS_Prototype1_UserManual.doc
features
plugins
tests
OK
Cancel

Figure 156 - Select Artefact from the SVN Remote Repository



https://sg1.esilab.org/opencoss/impl/opencoss/trunk

Location: doc/Opencoss_SDVS.pdf

Revision	Date	Author	Comment
1408	10/21/2013 14:54:57	angel.lopez	New artefact Opencoss_SDVS

Figure 157 - SVN History table of a File

2. Clicking the “Open” button will launch the corresponding application to open de file. In case of remote repository, the file will be downloaded in a local temporally file.
3. Clicking the “Delete” button will delete the file from the repository, local or remote.

7.4.2 Delete an artefact resource.

To delete an artefact resource:

1. After selecting the artefact resource, press the right mouse button and select the contextual menu *Delete*.

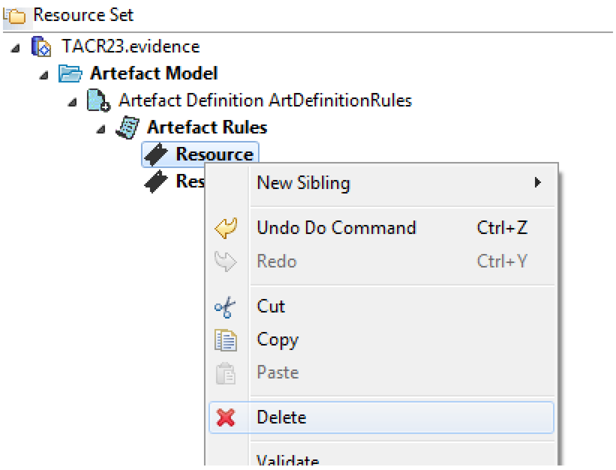
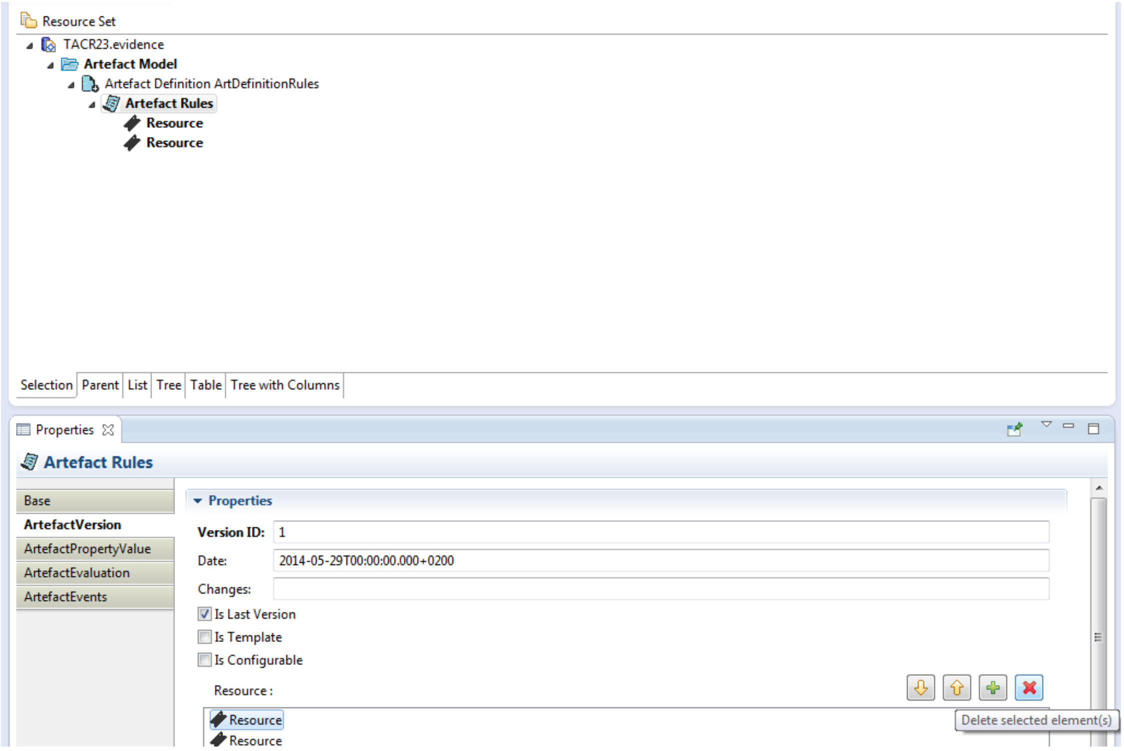


Figure 158 - Delete Artefact Resource I.

2. Or, select the artefact version tab, select the Resource to remove, and press the icon button ✖



Version ID: 1

Date: 2014-05-29T00:00:00.000+0200

Changes:

☑ Is Last Version

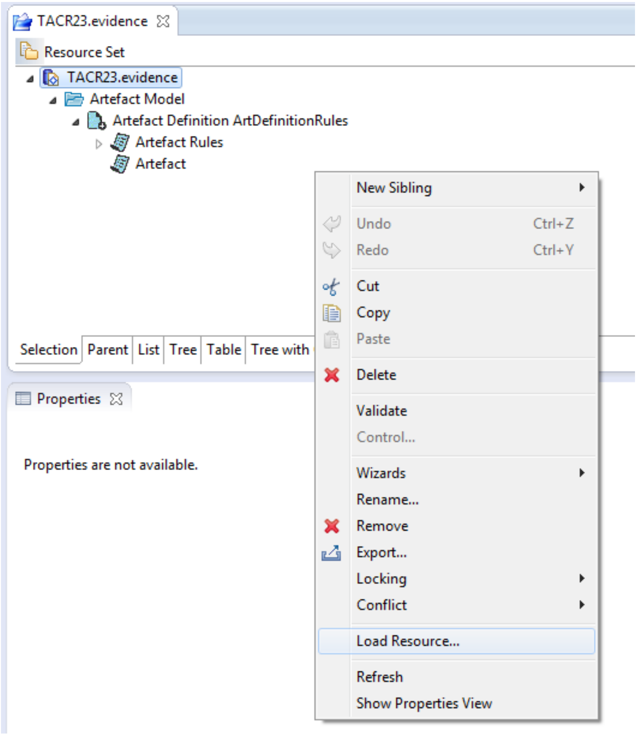
□ Is Template

□ Is Configurable

Figure 159 - Delete Artefact Resource II.

7.5 Artefact Property Value

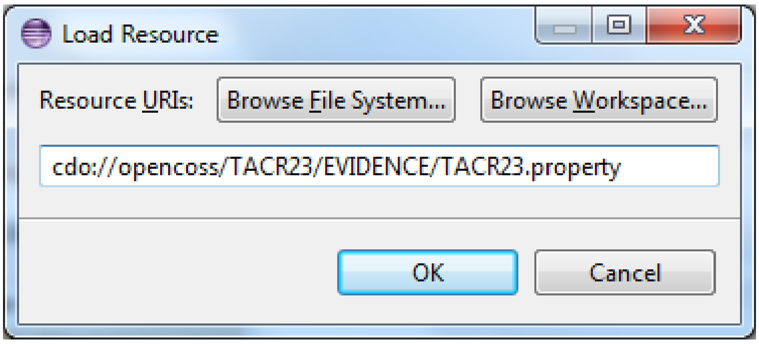
Firstly, it’s necessary to load the CDO resource property model (.property). So, press the editing window and select “Load Resource” in the context menu.



Properties are not available.

Figure 160 - Load Resource Property model.

Then introduce the URI of the property model.



cdo://opencoss/TACR23/EVIDENCE/TACR23.property

Figure 161 - Select Property model.

7.5.1 Add an artefact property value to an artefact

Once the artefact is selected, it is possible to add an artefact property in two ways:

1. One way, selecting the tab Artefact Property Value and pressing the button Add to bring up the Property Value dialog box:

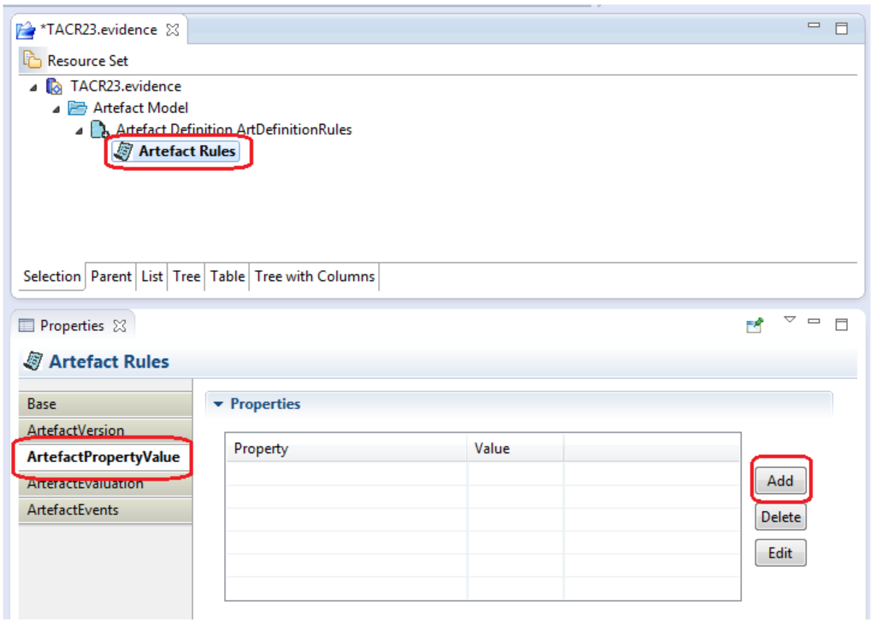
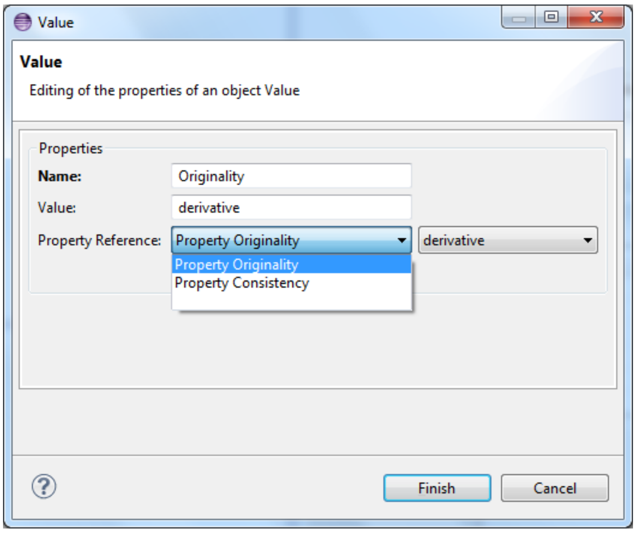


Figure 162 - Add Artefact Property Value I.



Name: Originality

Value: derivative

Property Reference: Property Originality | derivative

Figure 163 - Artefact Value dialog box

2. Another way, pressing the right mouse button and selecting the contextual menu New Child -> Value to bring up the Artefact Property properties.

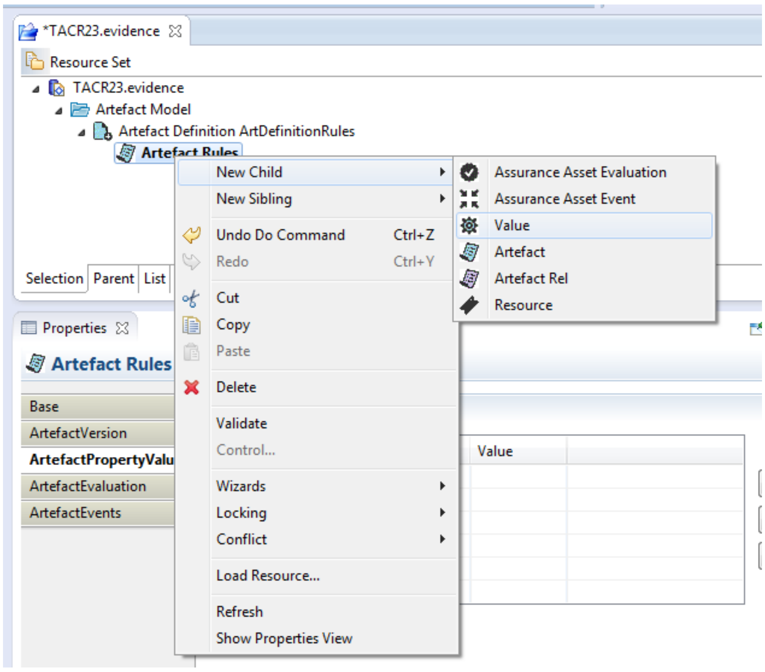


Figure 164 - Add Artefact Property Value II

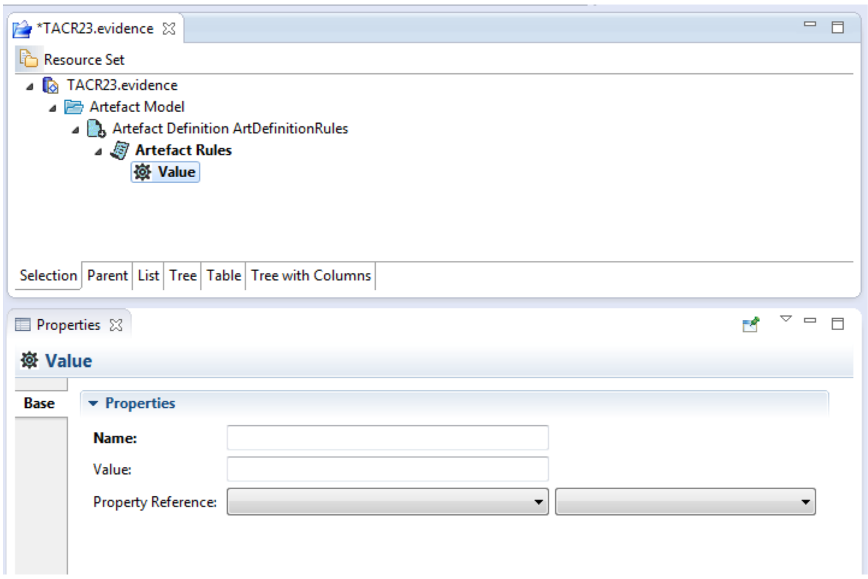
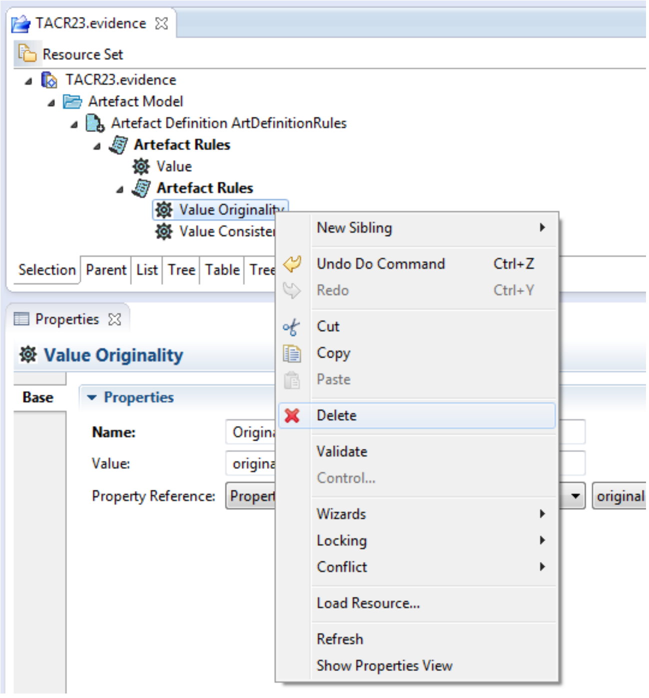


Figure 165 - Artefact Property properties

7.5.2 Delete an artefact property value

It is possible to delete an artefact property in two ways:

1. One way, select the artefact property in the tree, press the right mouse button and select the contextual menu *Delete*.



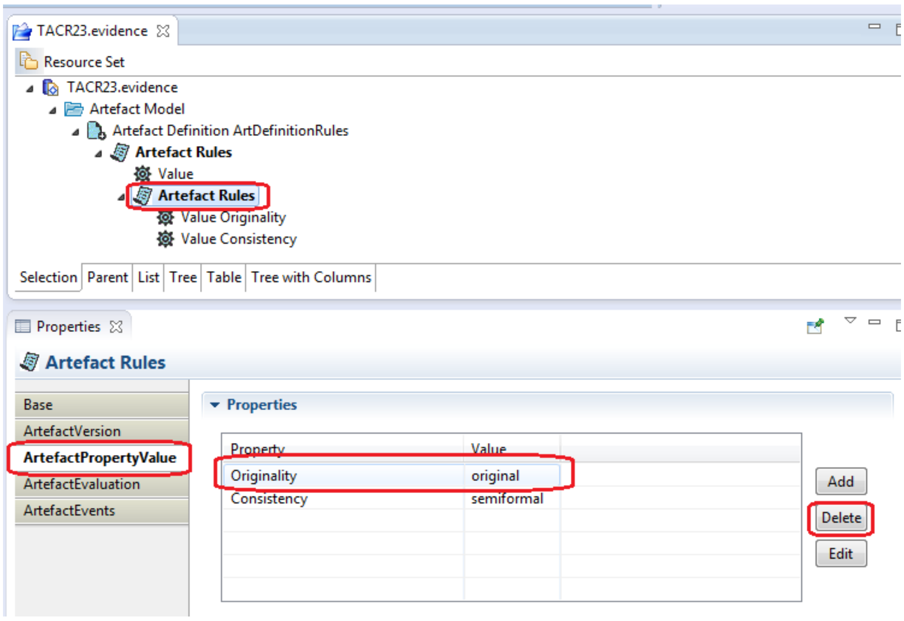
Name: Origin

Value: origina

Property Reference: Propert original

Figure 166 - Delete Artefact Property Value I

2. Another way, select the parent artefact of the artefact property to remove in the tree, select the Artefact Property value tab, select the artefact property and select the button Delete.



Property	Value
Originality	original
Consistency	semiformal

Figure 167 - Delete Artefact Property Value II

7.6 Artefact Assurance Asset Evaluation

7.6.1 Add an artefact assurance asset evaluation to an artefact

Once the artefact is selected, it is possible to add an assurance asset evaluation in two ways:

1. One way, selecting the tab Artefact Evaluation and pressing the button Add to bring up the an Assurance Asset Evaluation dialog box:

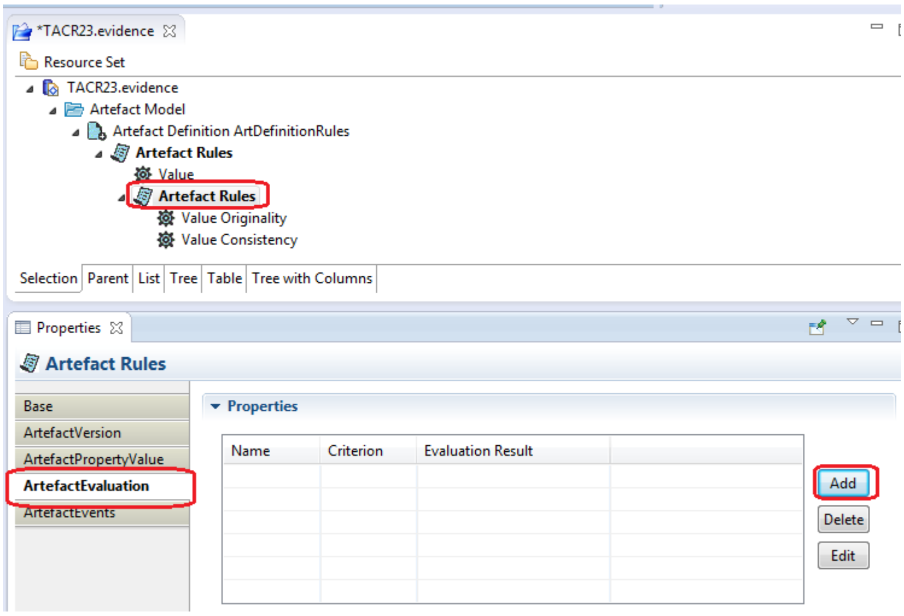


Figure 168 - Add Artefact Assurance Asset Evaluation I

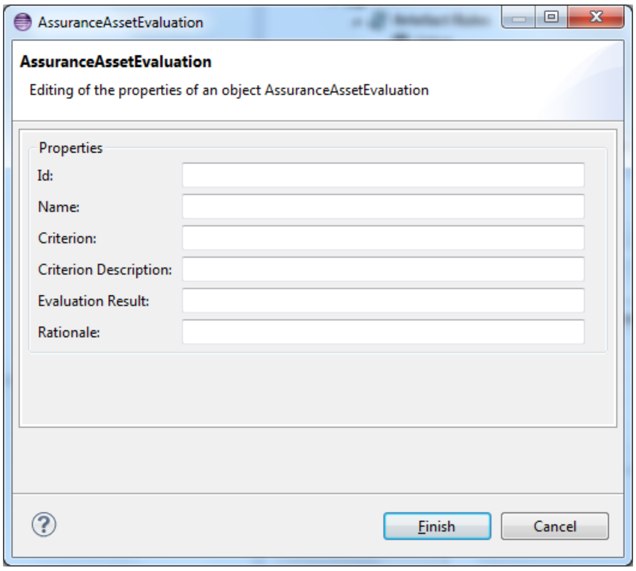


Figure 169 - Artefact Assurance Asset Evaluation dialog box

2. Another way, pressing the right mouse button and selecting the contextual menu New Child -> Assurance Asset Evaluation to bring up the Assurance Asset Evaluation properties.

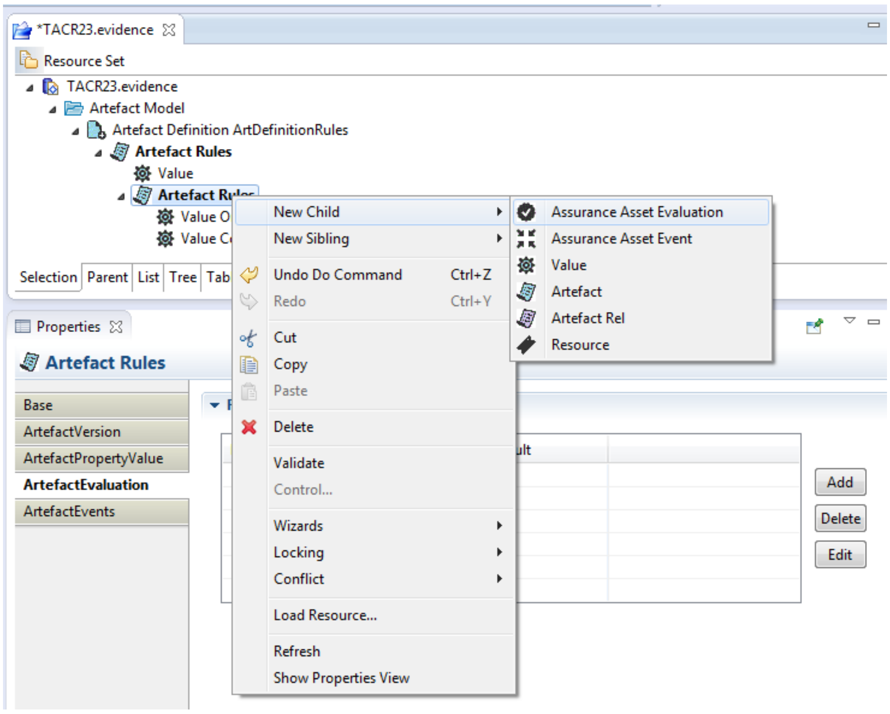
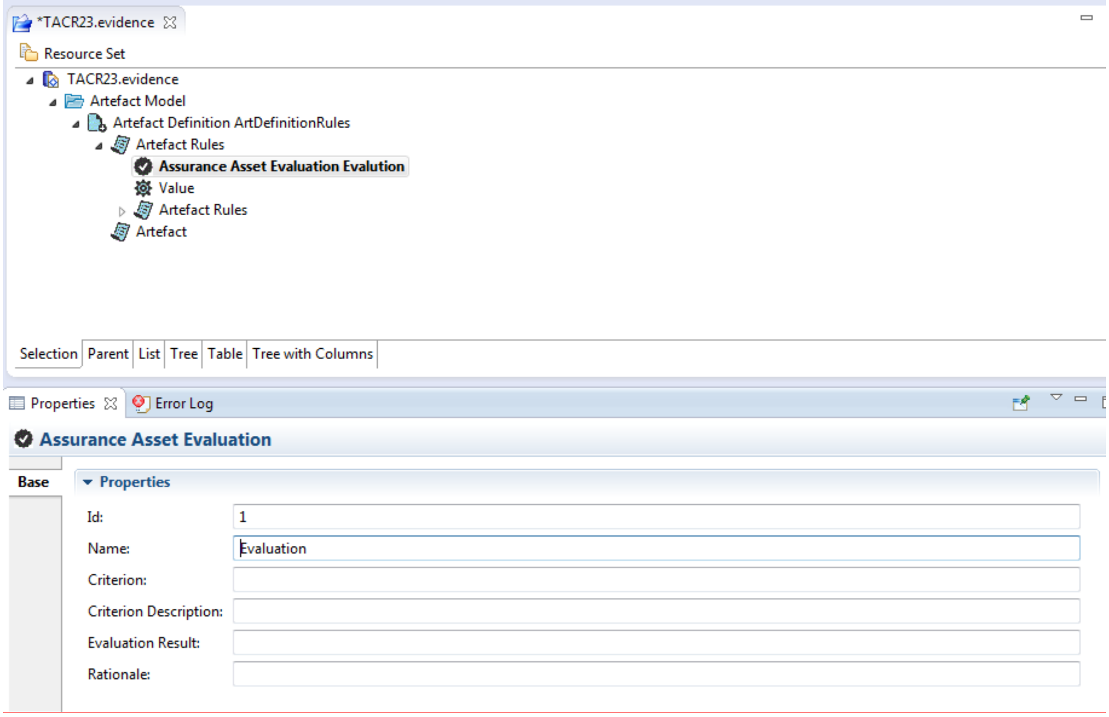


Figure 170 - Add Artefact Assurance Asset Evaluation II



Id: 1
Name: Evaluation
Criterion:
Criterion Description:
Evaluation Result:
Rationale:

Figure 171 - Artefact Assurance Asset Evaluation properties

7.6.2 Delete an artefact assurance asset evaluation

It is possible to delete an assurance assets evaluation in two ways:

1. One way, select the assurance assets evaluation in the tree, press the right mouse button and select the contextual menu *Delete*.

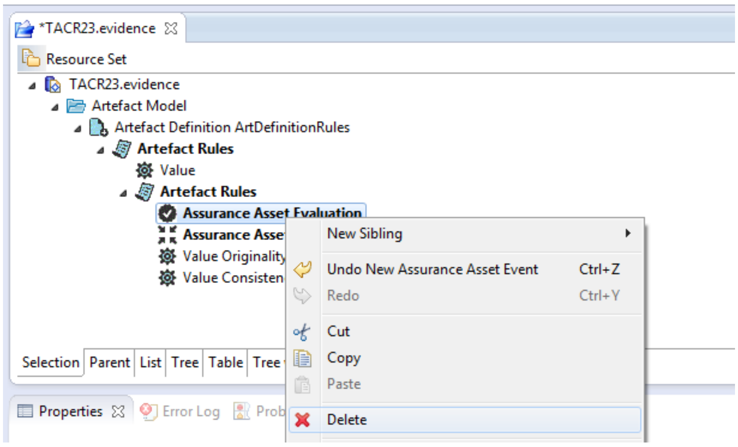
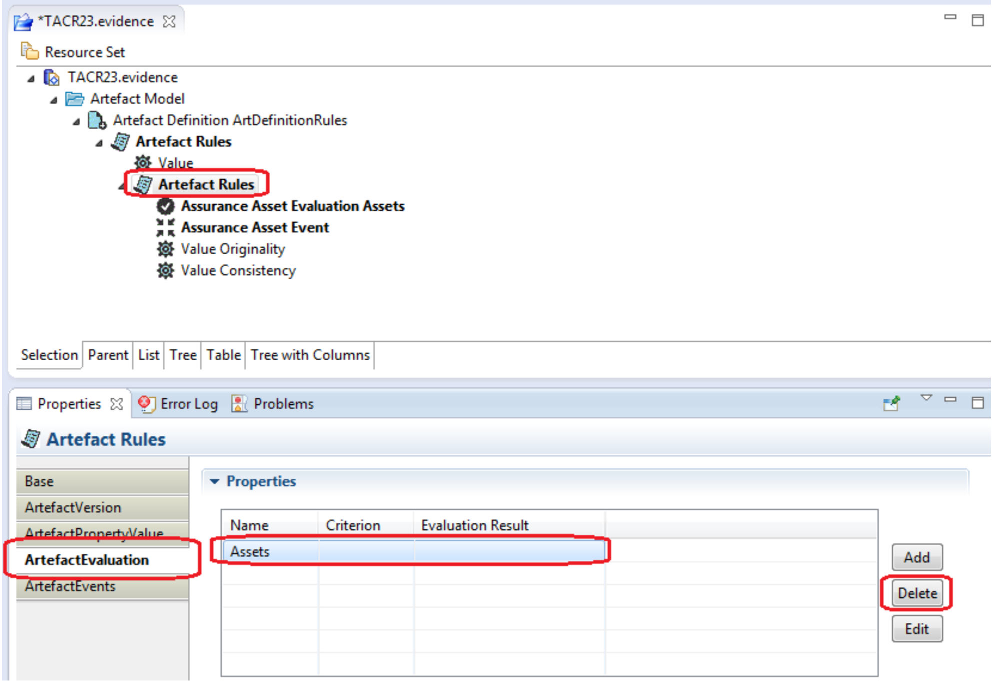


Figure 172 - Delete Artefact Assurance Asset Evaluation I

2. Another way, select the parent artefact of the assurance asset evaluation to remove in the tree, select the Artefact Evaluation tab, select assurance asset evaluation and select the button Delete.



Name	Criterion	Evaluation Result
Assets		

Figure 173 - Delete Artefact Assurance Asset Evaluation II

7.7 Artefact Assurance Asset Events.

7.7.1 Add an artefact assurance asset event to an artefact

Once the artefact is selected, it is possible to add an assurance asset event in two ways:

1. One way, selecting the tab Artefact Events and pressing the button Add to bring up the an Assurance Asset Event dialog box:

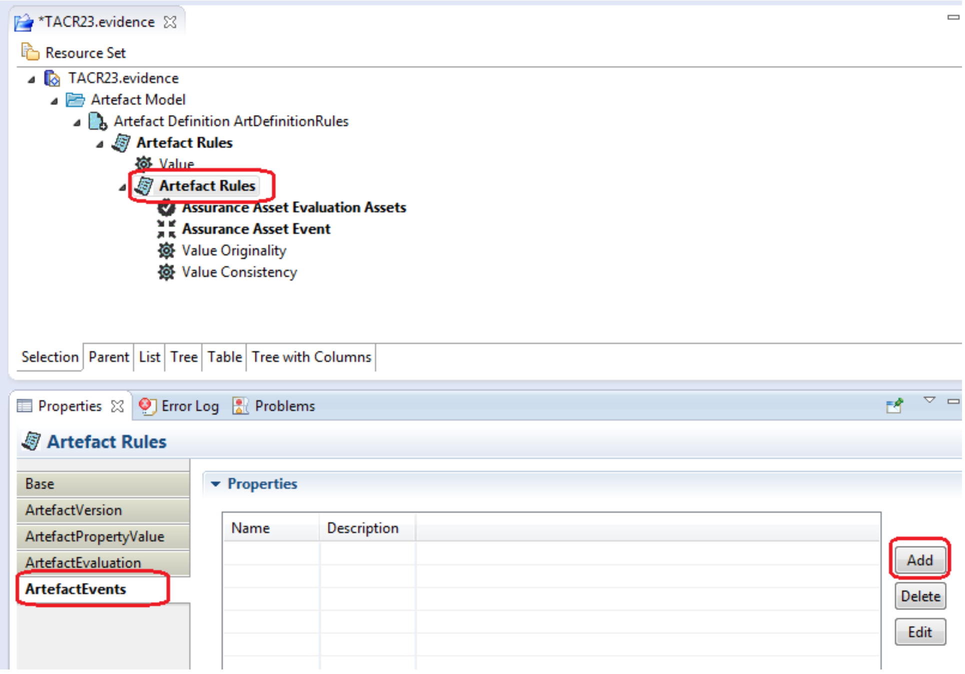
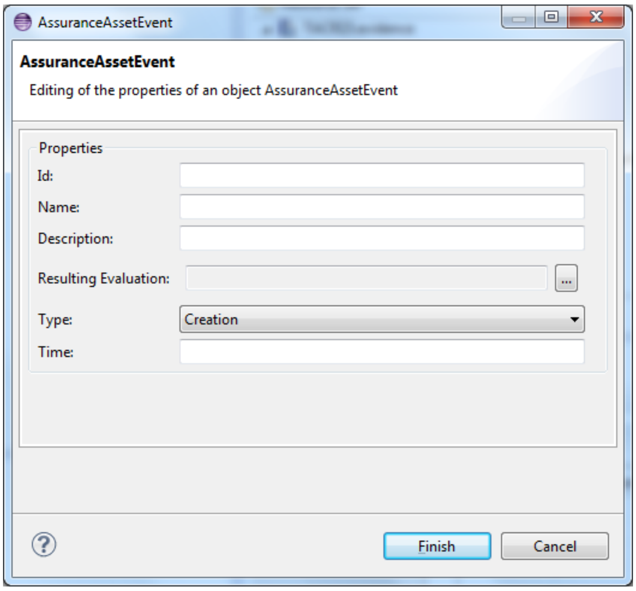


Figure 174 - Add Artefact Assurance Asset Event I


AssuranceAssetEvent

AssuranceAssetEvent

Editing of the properties of an object AssuranceAssetEvent

Properties

Id:

Name:

Description:

Resulting Evaluation:

Type: Creation

Time:

Figure 175 - Artefact Assurance Asset Event dialog box

2. Another way, pressing the right mouse button and selecting the contextual menu New Child -> Assurance Asset Evaluation to bring up the Assurance Asset Evaluation properties.

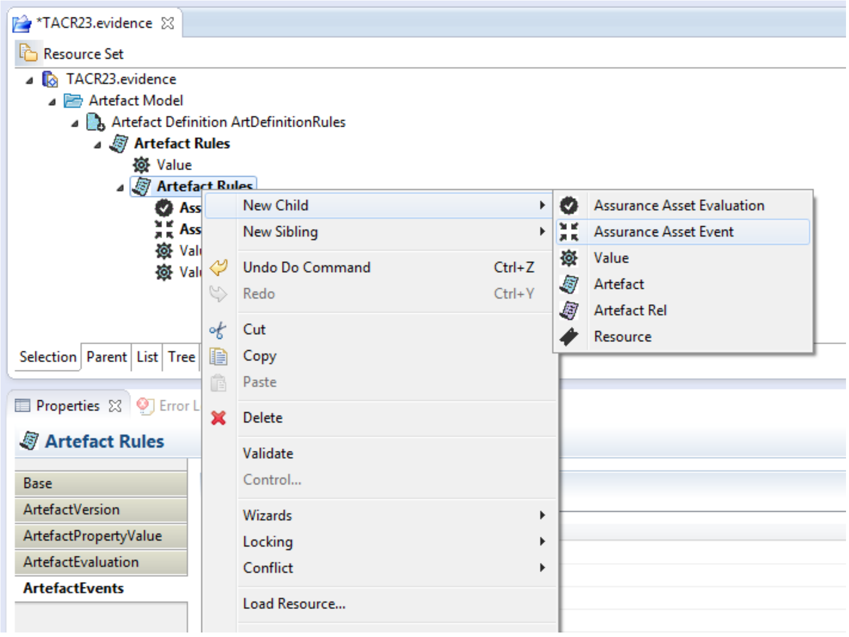
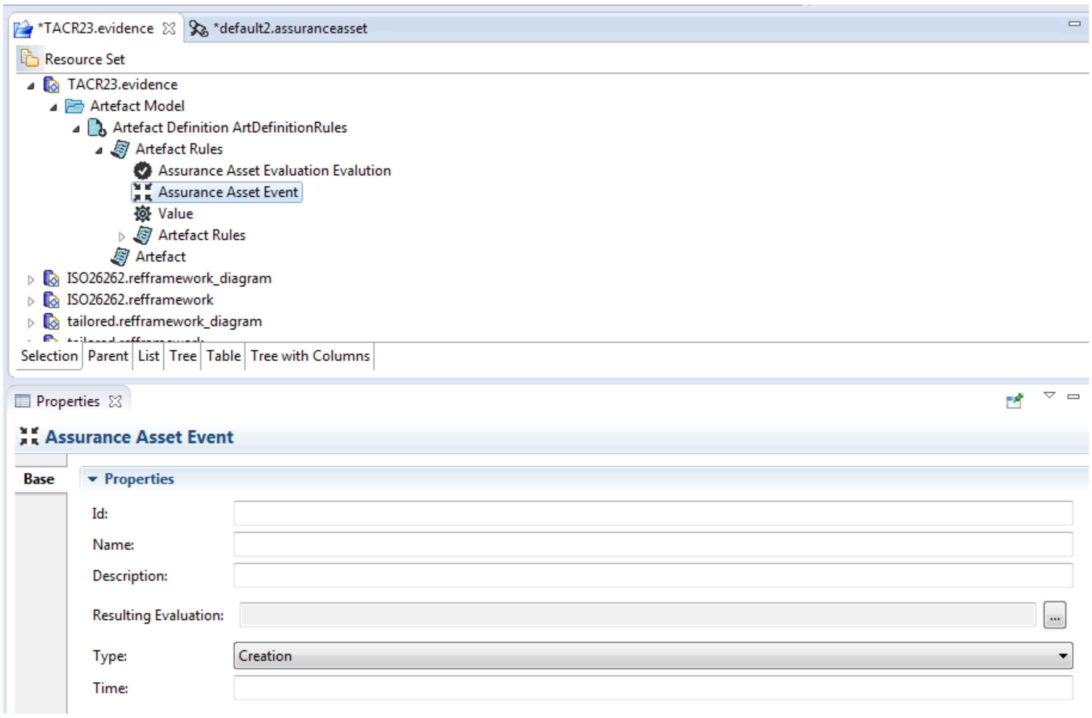


Figure 176 - Add Artefact Assurance Asset Event II



Type: Creation

Figure 177 - Artefact Assurance Asset Event properties

7.7.2 Delete an artefact assurance asset event

It is possible to delete an assurance assets event in two ways:

1. One way, select the assurance assets event in the tree, press the right mouse button and select the contextual menu *Delete*.

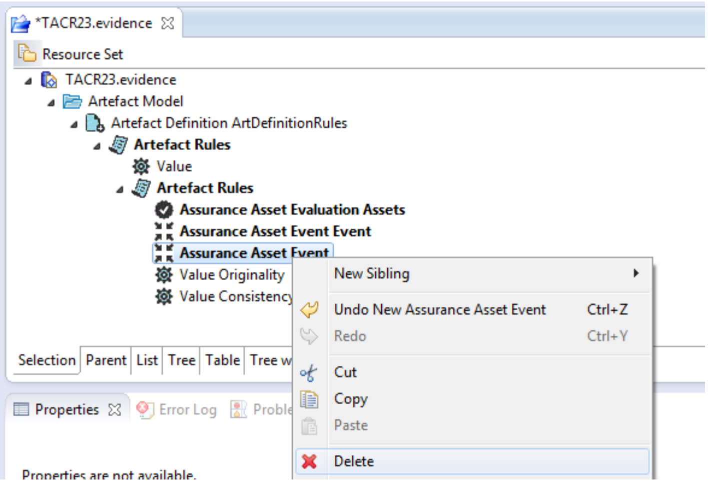

*TACR23.evidence
Resource Set
TACR23.evidence
Artefact Model
Artefact Definition ArtDefinitionRules
Artefact Rules
Value
Artefact Rules
Assurance Asset Evaluation Assets
Assurance Asset Event Event
Assurance Asset Event
Value Originality
Value Consistency
New Sibling
Undo New Assurance Asset Event Ctrl+Z
Redo Ctrl+Y
Cut
Copy
Paste
Delete
Selection Parent List Tree Table Tree w
Properties Error Log Proble
Properties are not available.

Figure 178 - Delete Artefact Assurance Asset Event I

2. Another way, select the parent artefact of the assurance asset event to remove in the tree, select the Artefact Event tab, select assurance asset event and select the button Delete

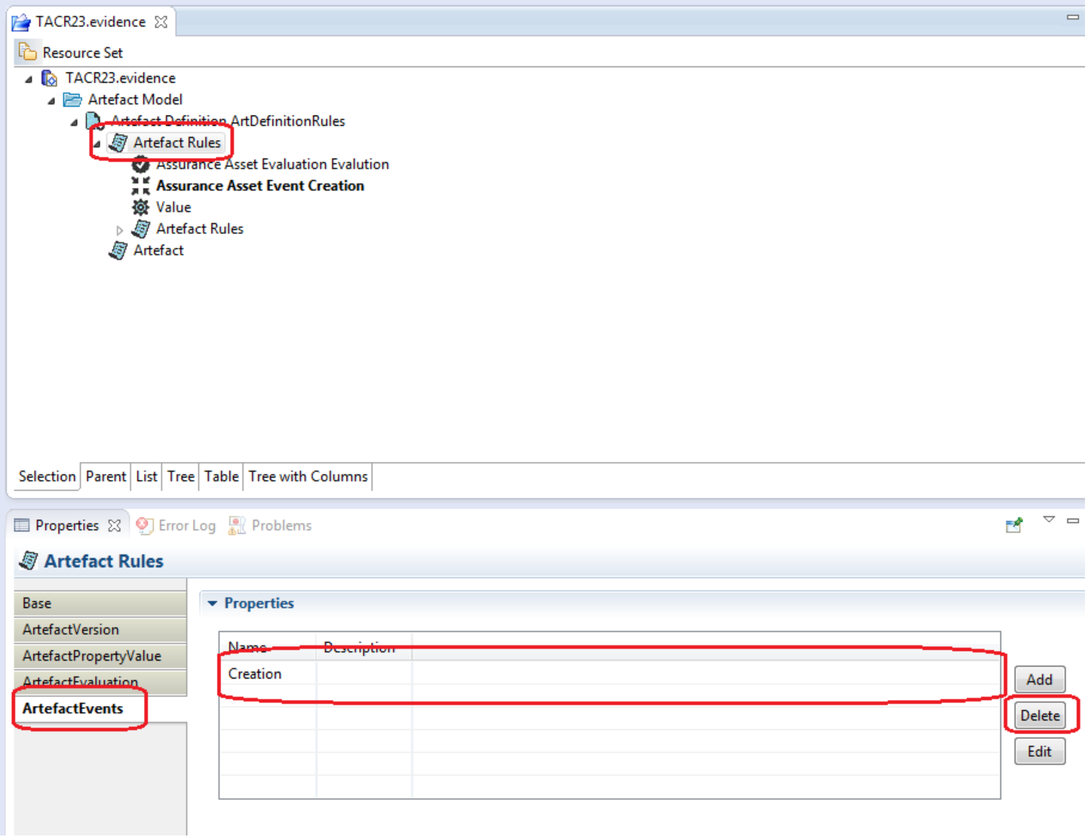
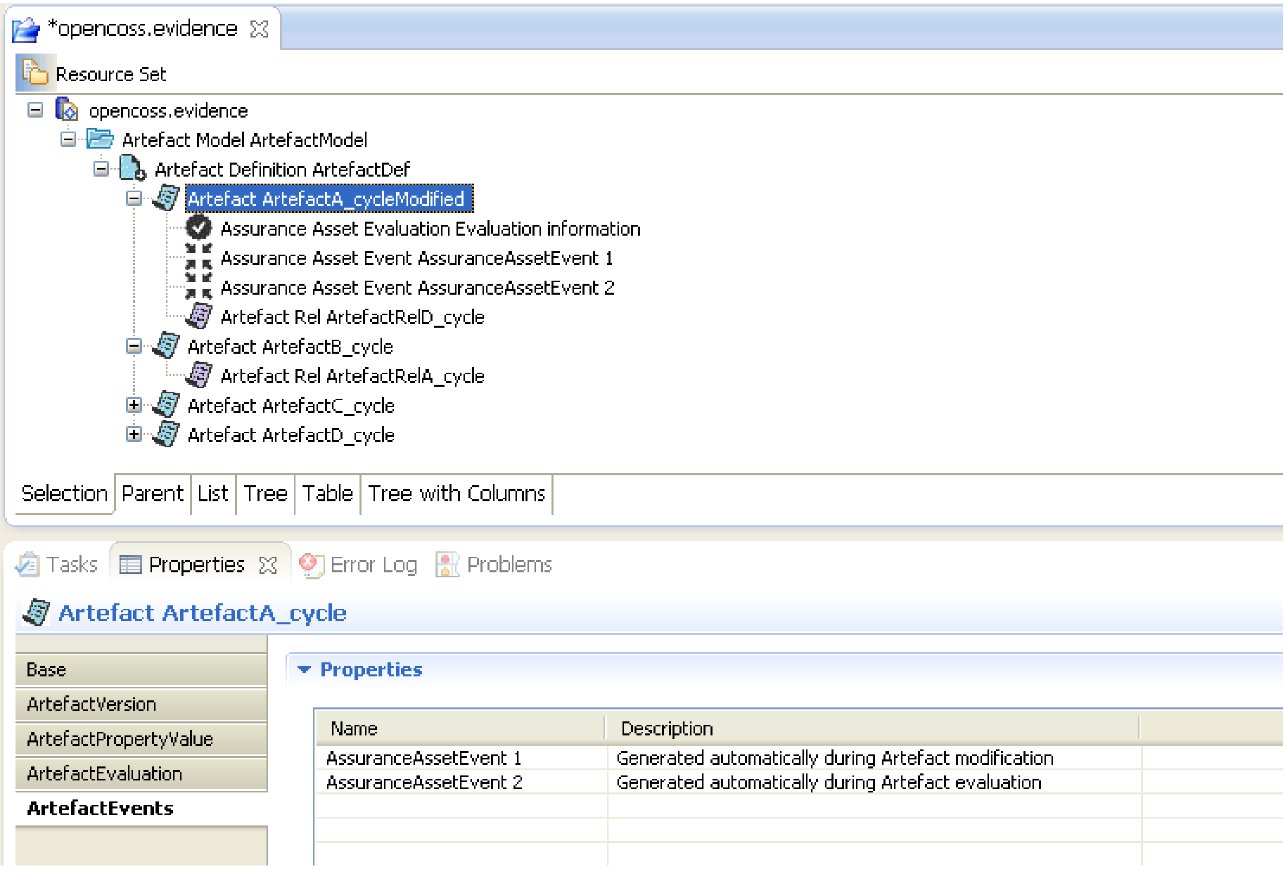


Figure 179 - Delete Artefact Assurance Asset Event II

7.8 Impact analysis

This functionality informs to the user about the impact of the changes in one Artefact that affect to others taking into account the relations between the modified and the impacted artefacts ones.

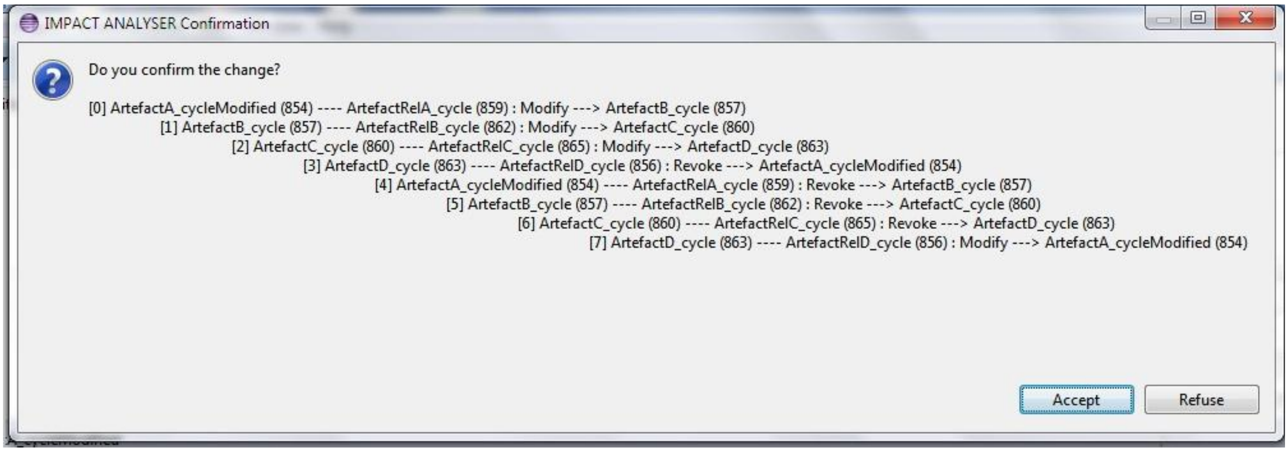
When the user clicks the save button 💾 to store the modifications made in one evidence model, for each Artefact modified with impact to another, the user will be asked in a confirmation dialog if he is agree or not with the showed impact information in form of tree or not.



Name	Description
AssuranceAssetEvent 1	Generated automatically during Artefact modification
AssuranceAssetEvent 2	Generated automatically during Artefact evaluation

Figure 180 - Artefact modified with automatically generated events

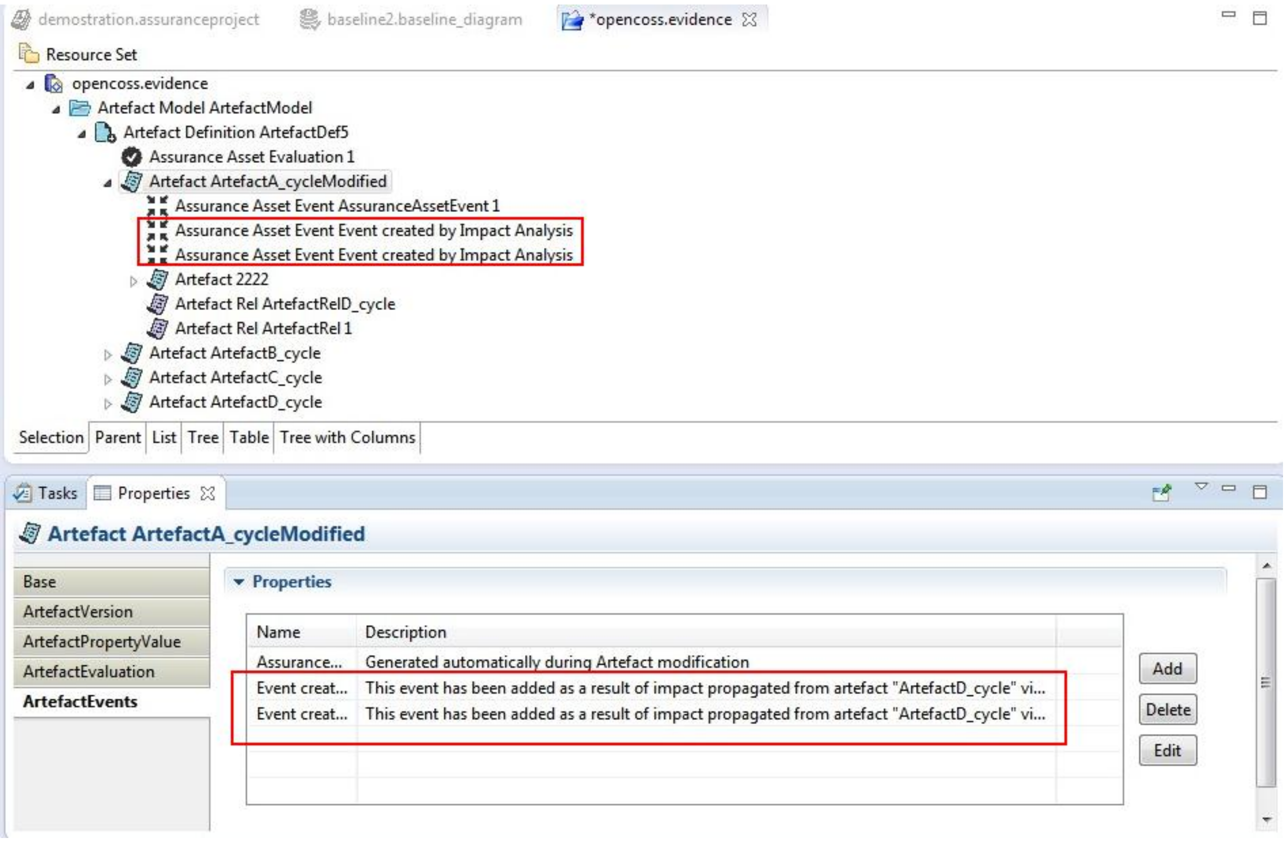
If the user accepts the impact showed new assurance assents events will be generated to the modified and impacted artefacts.



Do you confirm the change?

```
[0] ArtefactA_cycleModified (854) ---- ArtefactRelA_cycle (859) : Modify ---> ArtefactB_cycle (857)
        [1] ArtefactB_cycle (857) ---- ArtefactRelB_cycle (862) : Modify ---> ArtefactC_cycle (860)
                [2] ArtefactC_cycle (860) ---- ArtefactRelC_cycle (865) : Modify ---> ArtefactD_cycle (863)
                        [3] ArtefactD_cycle (863) ---- ArtefactRelD_cycle (856) : Revoke ---> ArtefactA_cycleModified (854)
                                [4] ArtefactA_cycleModified (854) ---- ArtefactRelA_cycle (859) : Revoke ---> ArtefactB_cycle (857)
                                        [5] ArtefactB_cycle (857) ---- ArtefactRelB_cycle (862) : Revoke ---> ArtefactC_cycle (860)
                                                [6] ArtefactC_cycle (860) ---- ArtefactRelC_cycle (865) : Revoke ---> ArtefactD_cycle (863)
                                                        [7] ArtefactD_cycle (863) ---- ArtefactRelD_cycle (856) : Modify ---> ArtefactA_cycleModified (854)
```

Figure 181 - Artefact analyser confirmation windows



Resource Set
- opencoss.evidence
  - Artefact Model ArtefactModel
    - Artefact Definition ArtefactDef5
      - Assurance Asset Evaluation 1
      - Artefact ArtefactA_cycleModified
        - Assurance Asset Event AssuranceAssetEvent 1
        - Assurance Asset Event Event created by Impact Analysis
        - Assurance Asset Event Event created by Impact Analysis
        - Artefact 2222
        - Artefact Rel ArtefactRelD_cycle
        - Artefact Rel ArtefactRel 1
      - Artefact ArtefactB_cycle
      - Artefact ArtefactC_cycle
      - Artefact ArtefactD_cycle

Artefact ArtefactA_cycleModified

Name	Description
Assurance...	Generated automatically during Artefact modification
Event creat...	This event has been added as a result of impact propagated from artefact "ArtefactD_cycle" vi...
Event creat...	This event has been added as a result of impact propagated from artefact "ArtefactD_cycle" vi...

Figure 182 - Artefact events created by Impact Analyser

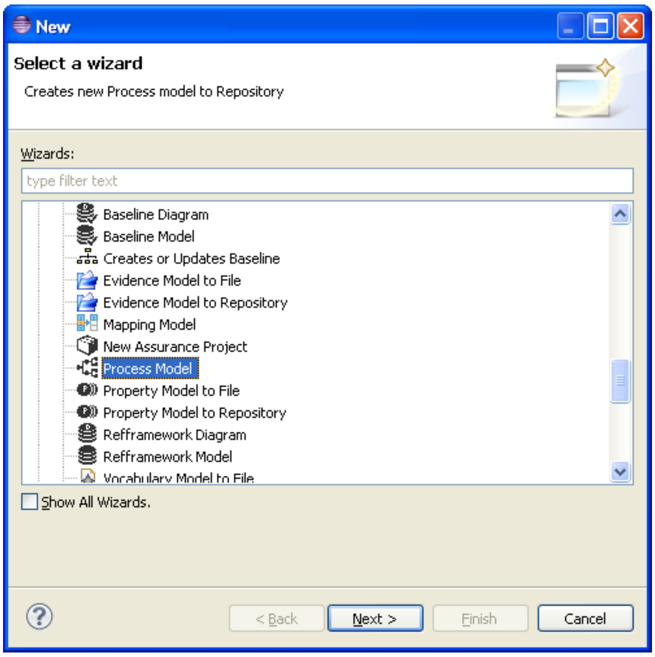
See also Impact Analysis described in server section in Change Impact Analysis chapter.

8 Process Assurance Management

The management of Process Assurances must be made through the creation of a new model of the type **Process Model**.

In order to generate a new Process Model, the following steps need to be done:

- First, select the entry of the menu *File -> New -> Other*.
- Inside the category *Opencoss*, select the *Process Model* and press the *Next* button.



New

Select a wizard

Creates new Process model to Repository

Wizards:

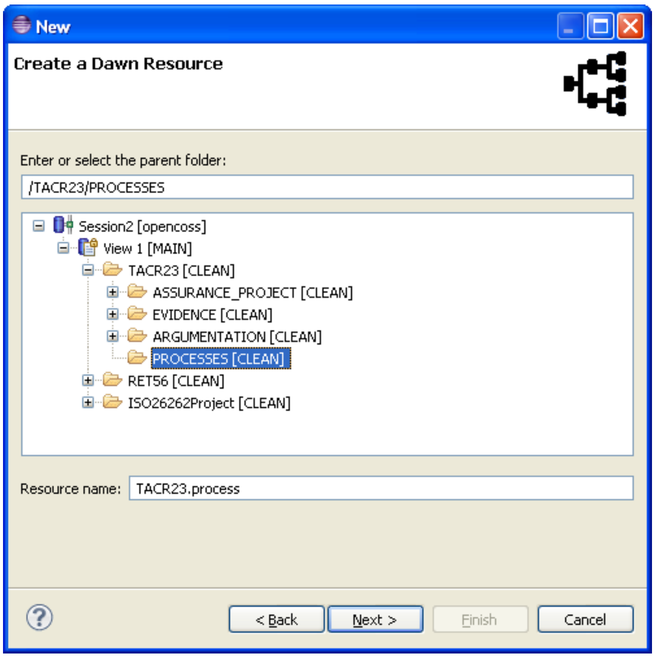
type filter text

- Baseline Diagram
- Baseline Model
- Creates or Updates Baseline
- Evidence Model to File
- Evidence Model to Repository
- Mapping Model
- New Assurance Project
- Process Model
- Property Model to File
- Property Model to Repository
- Refframework Diagram
- Refframework Model
- Vocabulary Model to File

□ Show All Wizards.

Figure 183 - New Process Model I

- Enter o select the parent folder, name the model and press the Next button.



New

Create a Dawn Resource

Enter or select the parent folder:

/TACR23/PROCESSES

- Session2 [opencoss]
  - View 1 [MAIN]
    - TACR23 [CLEAN]
      - ASSURANCE_PROJECT [CLEAN]
      - EVIDENCE [CLEAN]
      - ARGUMENTATION [CLEAN]
      - PROCESSES [CLEAN]
    - RET56 [CLEAN]
    - ISO26262Project [CLEAN]

Resource name: TACR23.process

Figure 184 - New Process Model II

- And finally, select the “Model” object to create

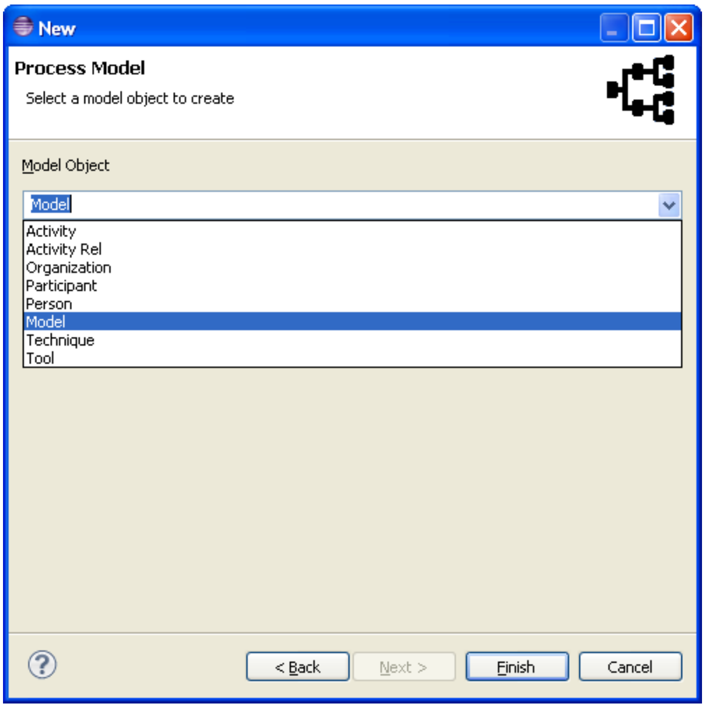


Figure 185 - New Process Model III

Once the Property Model has been created, the first item is presented to the user

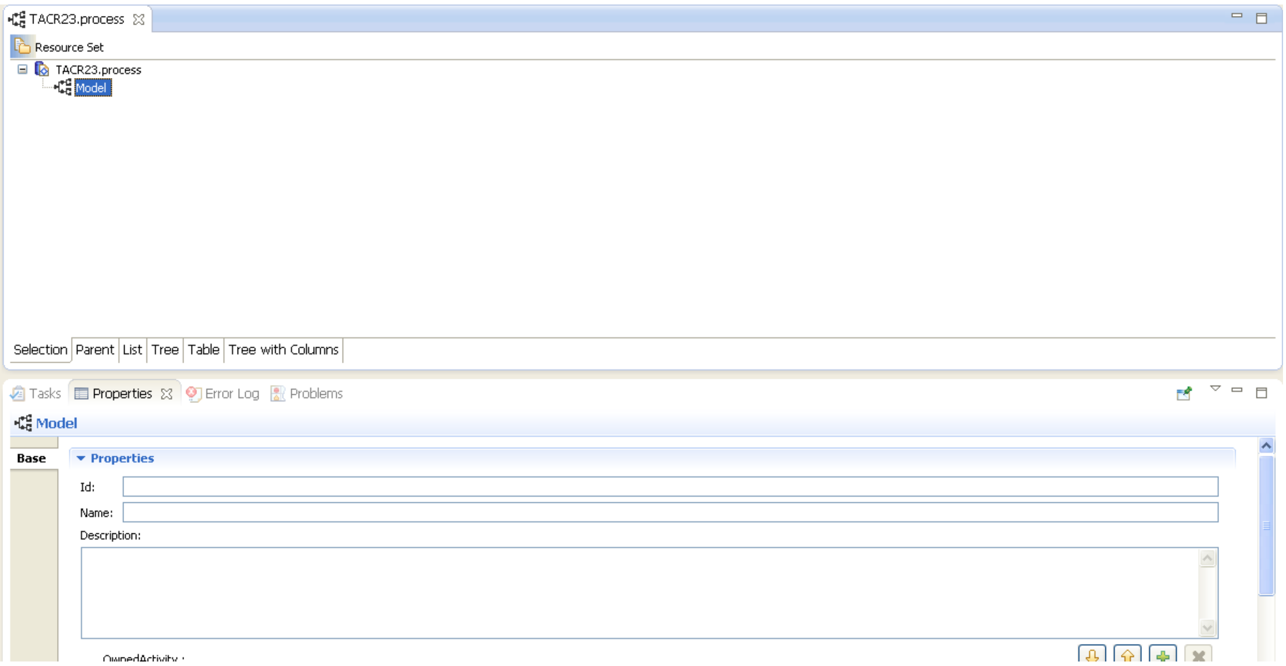


Figure 186 - Process Model

8.1 Creating Process Assurance data

The Process Model allows defining activity, participant, person, tool, organization or technique objects.

To create these objects, in the Model zone, click on the branch *Model* and press the right mouse button and select the contextual menu New Child or use its properties view:

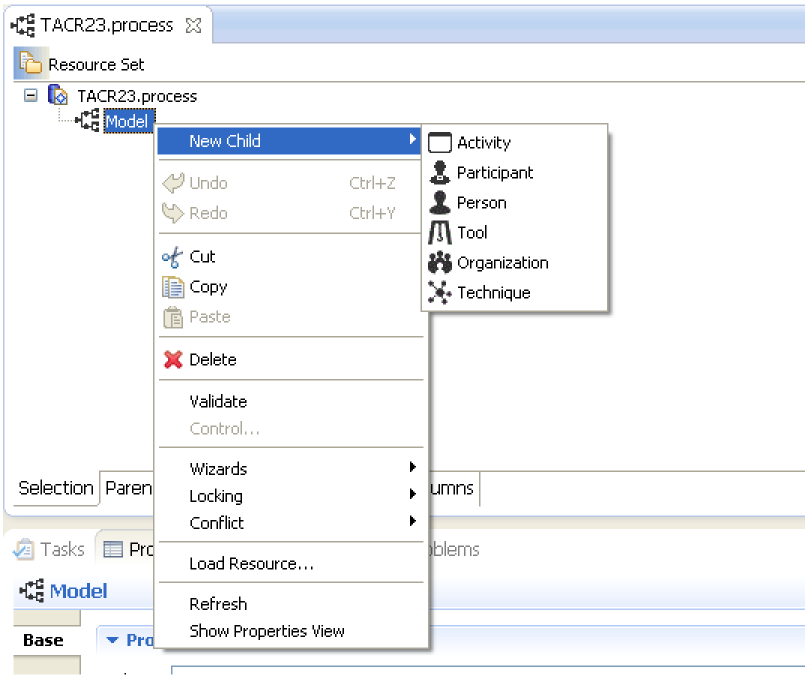


Figure 187 - Create Process Model data using context menu

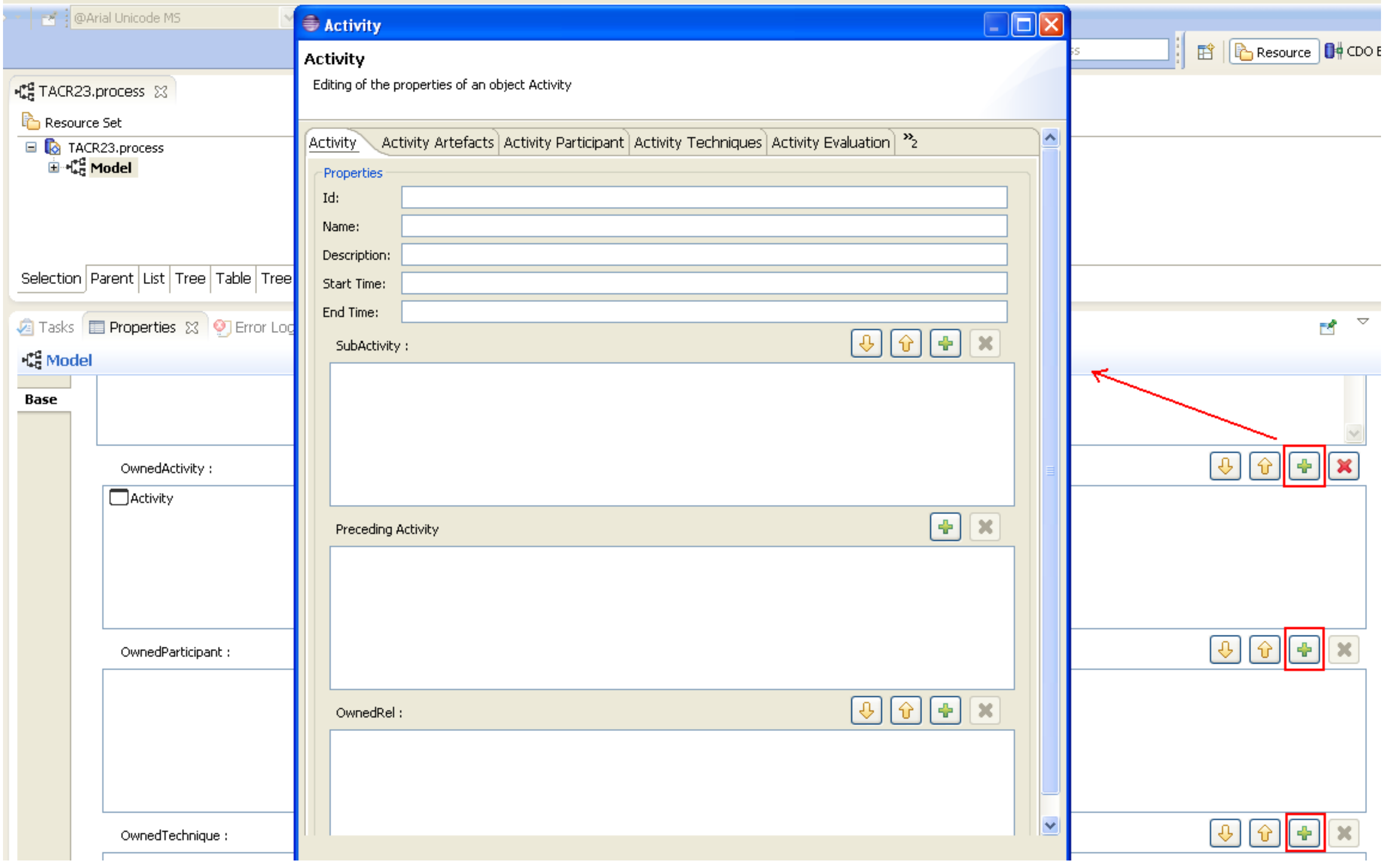


Figure 188 - Create Process Model data using properties View

8.2 Deleting Process Assurance Objects

To delete a Process Assurance Object, select the object to remove, press the right mouse button and select the contextual menu *Delete or select the information to delete using the properties view:*

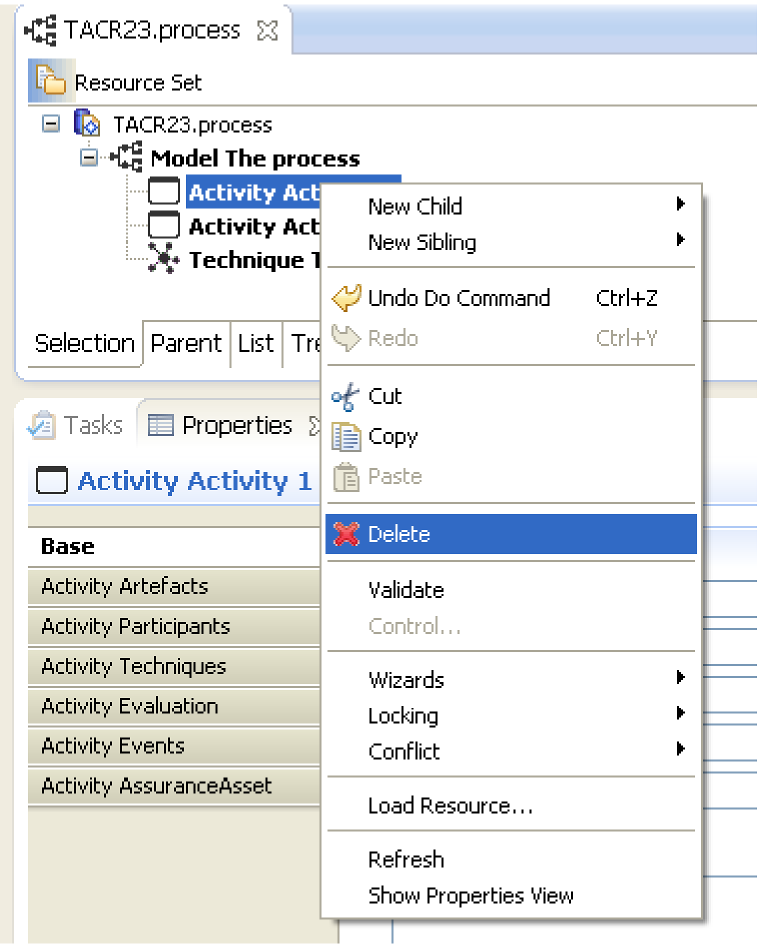
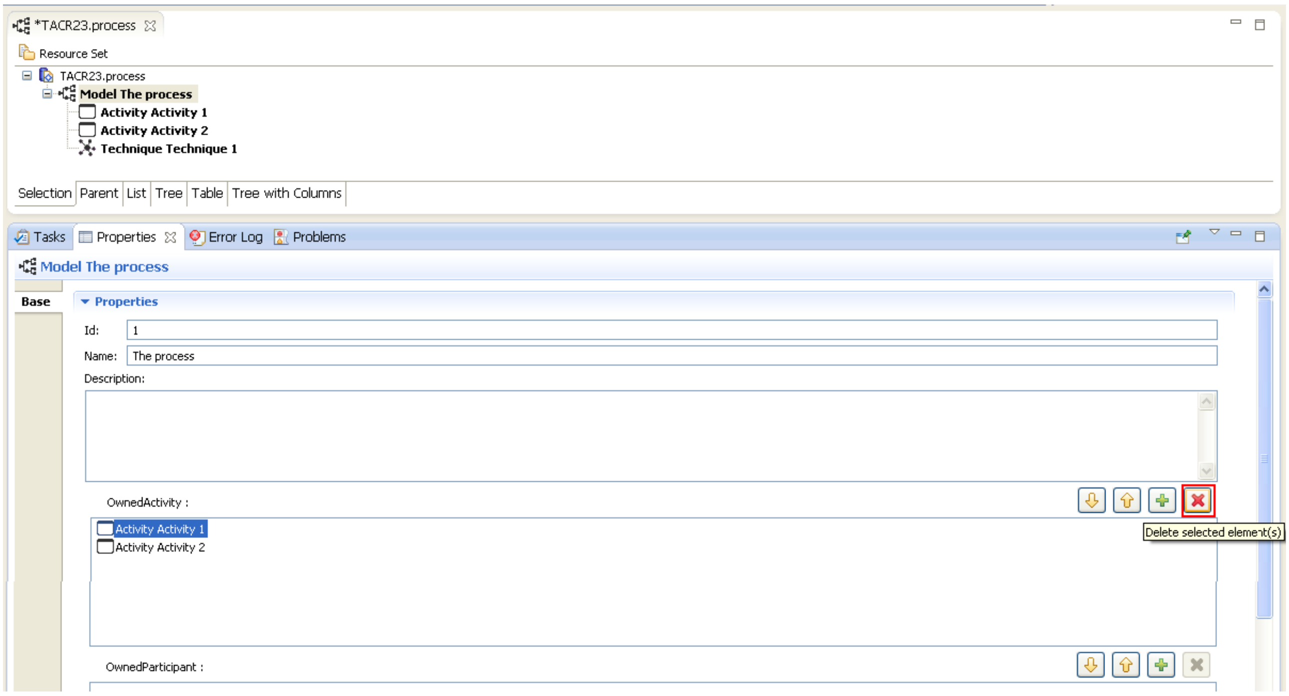


Figure 189 - Delete Process Model data using context menu



Id: 1

Name: The process

Description:

Figure 190 - Delete Process Model data using properties view

9 Properties Management.

The management of Properties must be made through the creation of a new model of the type **Property Model**.

In order to generate a new Property Model, the following steps need to be done:

- First, select the entry of the menu *File -> New -> Other*:

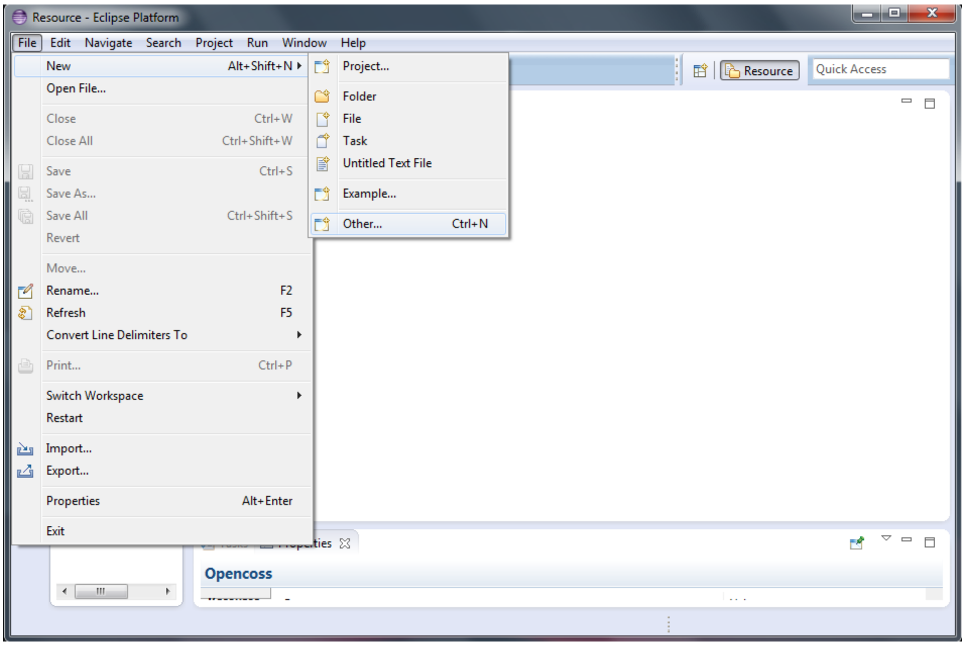
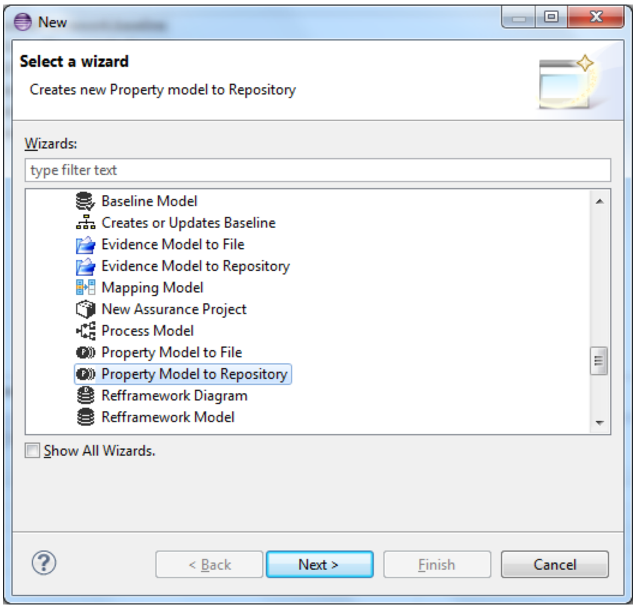


Figure 191 - New Property Model menu File -> New -> Other

- Inside the category of the wizard *Opencoss* , select the *Property Model* to the Repository and press the *Next* button:

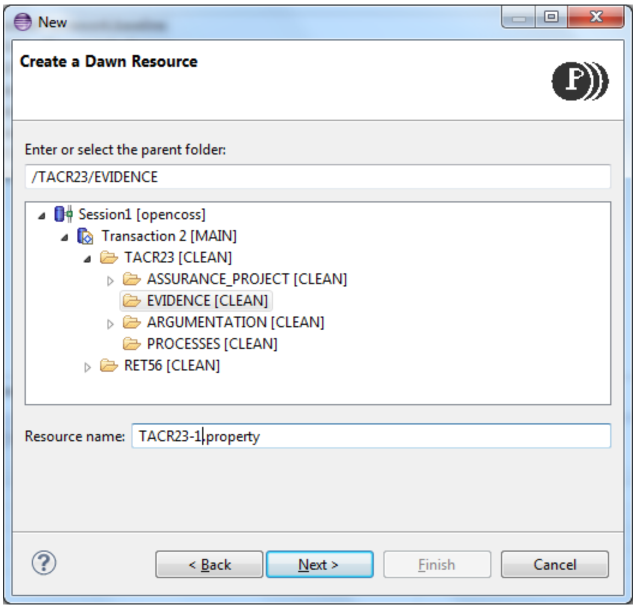

New

Select a wizard

Creates new Property model to Repository

Figure 192 - New Property Model I

- Enter o select the parent folder, the resource name and press the Next button:



New

Create a Dawn Resource

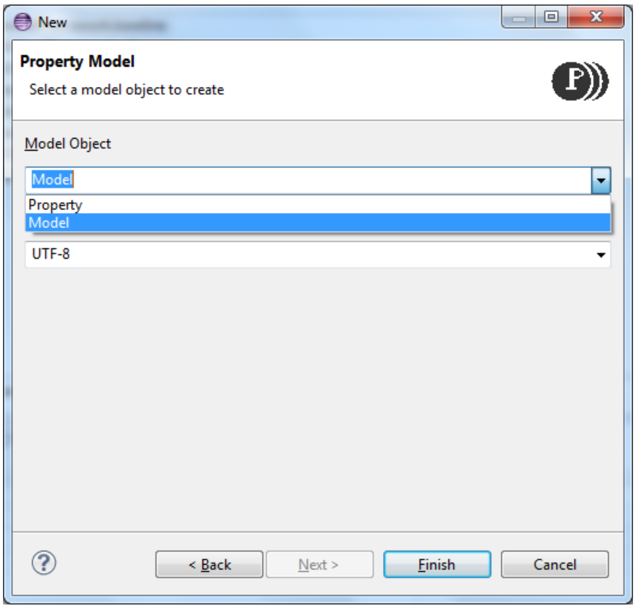
Enter or select the parent folder: /TACR23/EVIDENCE

```
Session1 [opencoss]
  Transaction 2 [MAIN]
    TACR23 [CLEAN]
      ASSURANCE_PROJECT [CLEAN]
      EVIDENCE [CLEAN]
      ARGUMENTATION [CLEAN]
      PROCESSES [CLEAN]
    RET56 [CLEAN]
```

Resource name: TACR23-1.property

Figure 193 - New Property Model II

- And finally, select the "Model" object to create.



New

Property Model

Select a model object to create

Model Object: Model

Figure 194 - New Property Model III

Once the Property Model has been created, the first item is presented to the user.

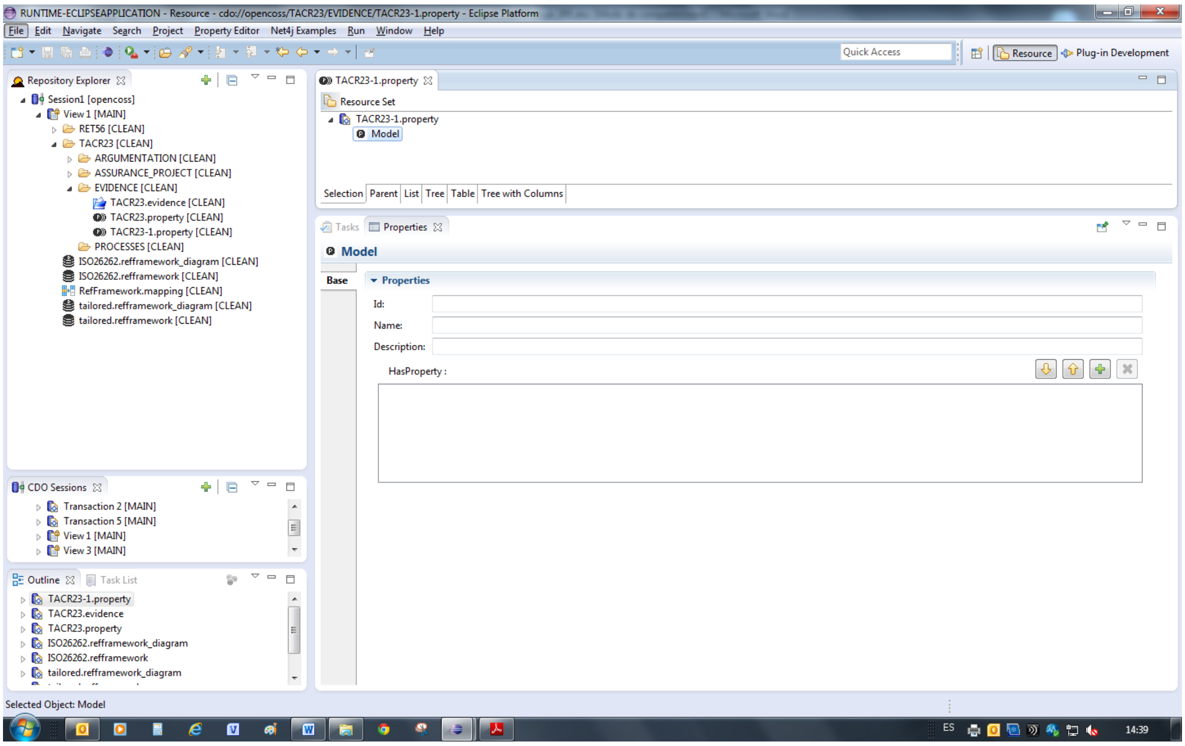


Figure 195 - Property Model

9.1 Property

9.1.1 Add a property

It is possible to add properties to a property model in two ways:

- Select the model element, press the right button of the mouse and select the contextual menu *New Child –> Property*

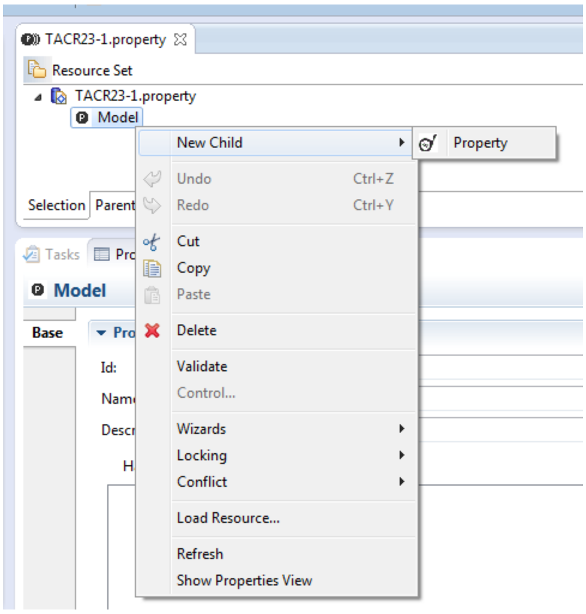


Figure 196 - Add New Property (I)

- Or, select the model element, and press the icon button ✚ *in the base tab*

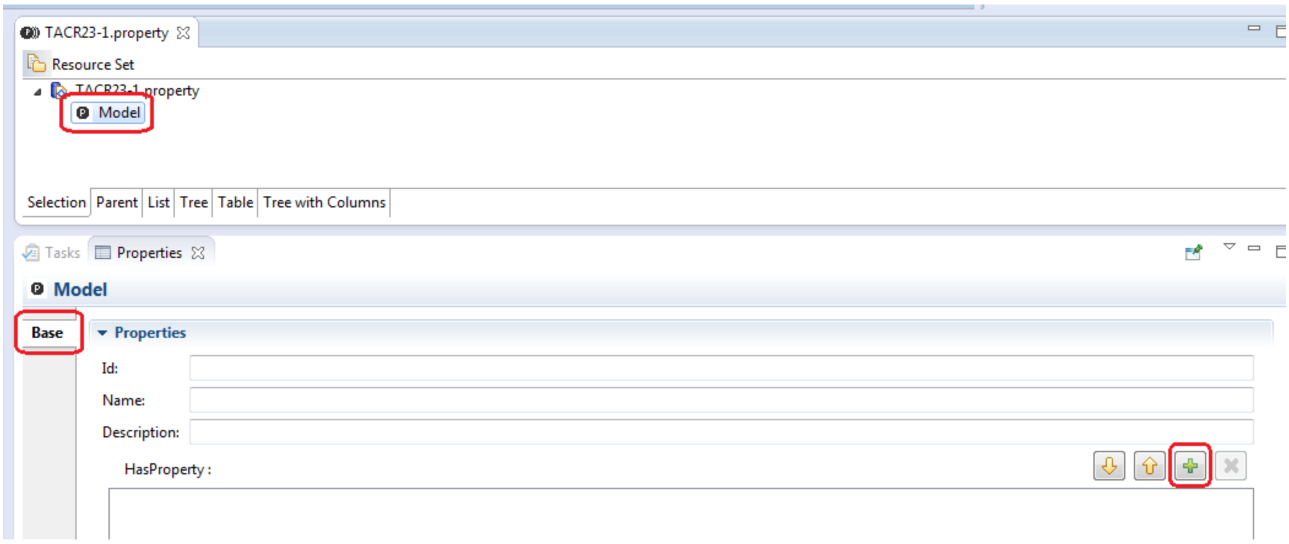
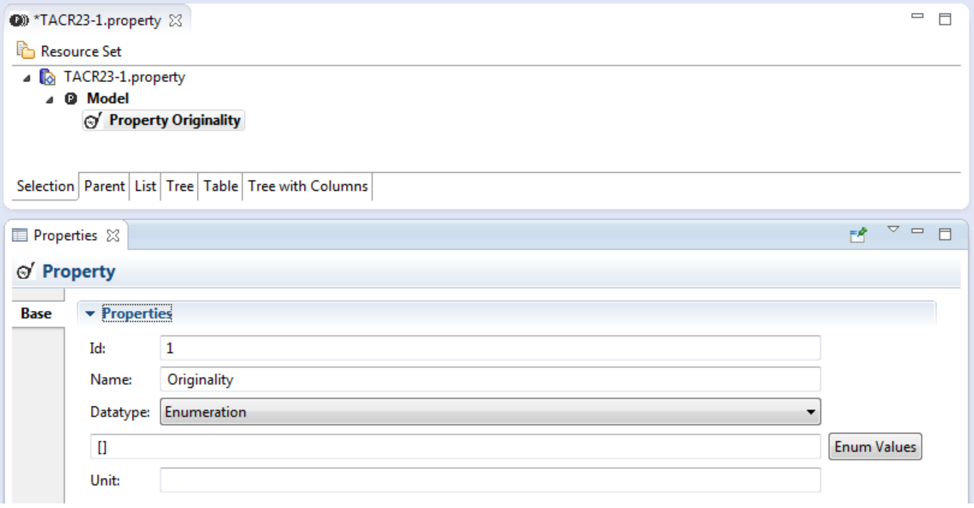


Figure 197 - Add New Property (II)

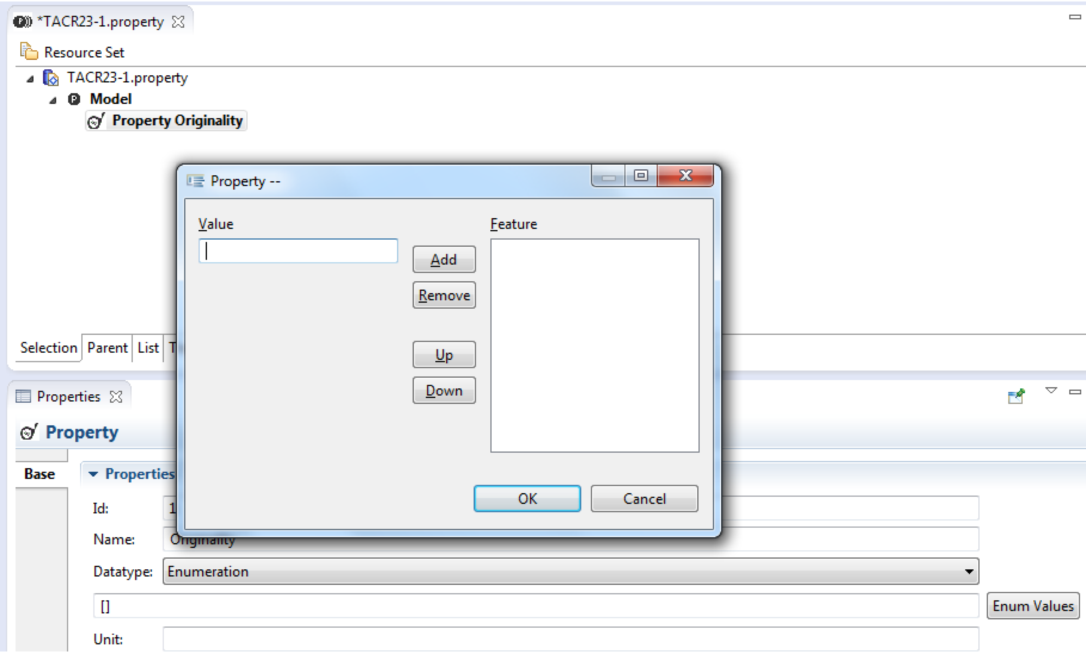
After these actions, in the properties zone, the framework presents several fields to describe the new property:



Id: 1
Name: Originality
Datatype: Enumeration
[]
Unit:

Figure 198 - Property properties

- Id: Property identifier.
- Name: Property name.
- Datatype: Property data type. Possible values: enumeration, string, integer and float.
- Enum values: values of an enumeration data type property. To add this values, press the button “Enum value”



Id: 1

Name: Originality

Datatype: Enumeration

[]

Unit:

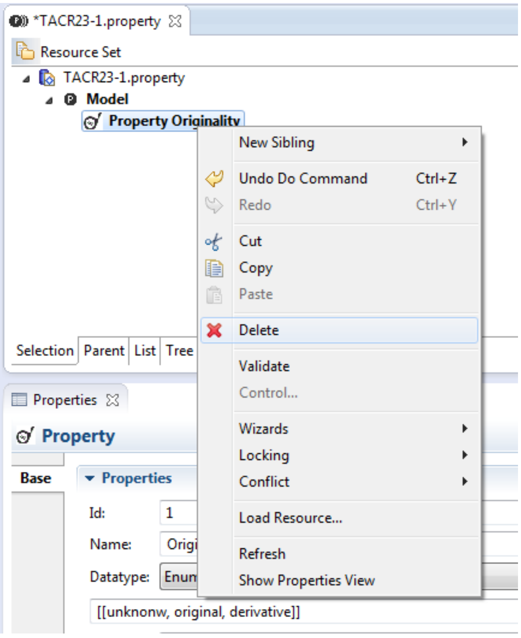
Figure 199 - Add enum values.

- Unit: unit value

9.1.2 Delete a property.

To delete a property:

- Select the property, press the right mouse button and select the contextual menu *Delete*.



Id: 1

Name: Origi

Datatype: Enum

[[unknonw, original, derivative]]

Figure 200 - Delete Property I.

- Or select the branch *Model that contains the property to delete, select the property and press the icon button* ✖

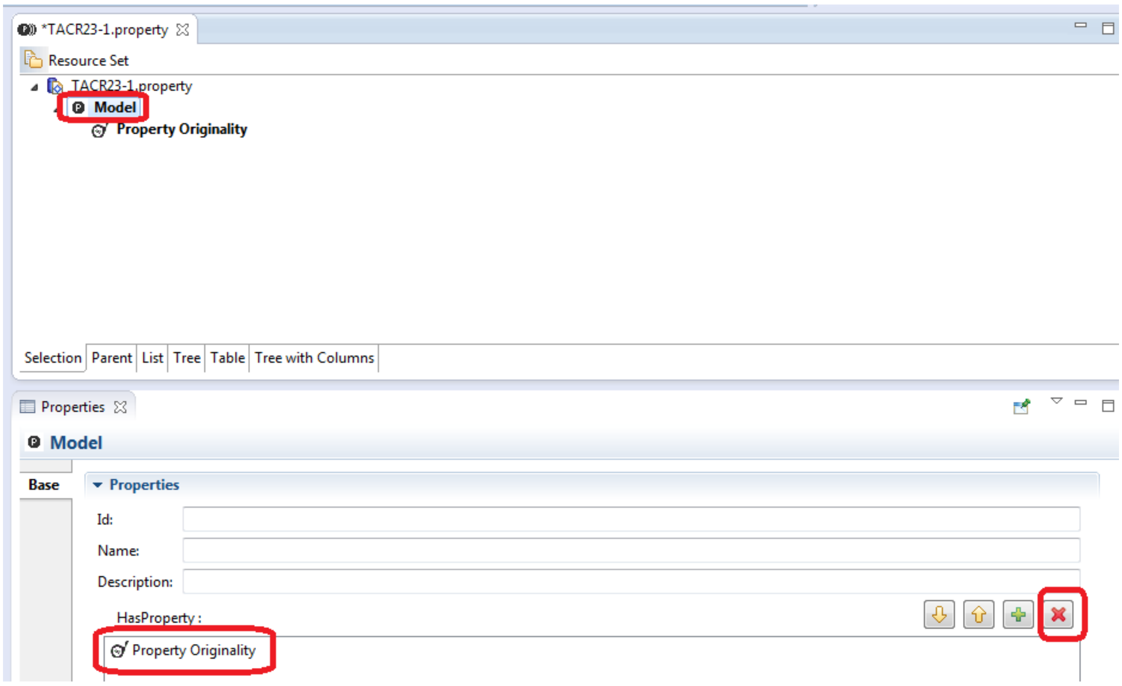


Figure 201 - Delete Property II.

10 Mapping Management

The management of Mapping must be made through the creation of a new model of the type Mapping **Model**.

In order to generate a new Mapping Model, the following steps need to be done:

- First, select the entry of the menu *File -> New -> Other*:

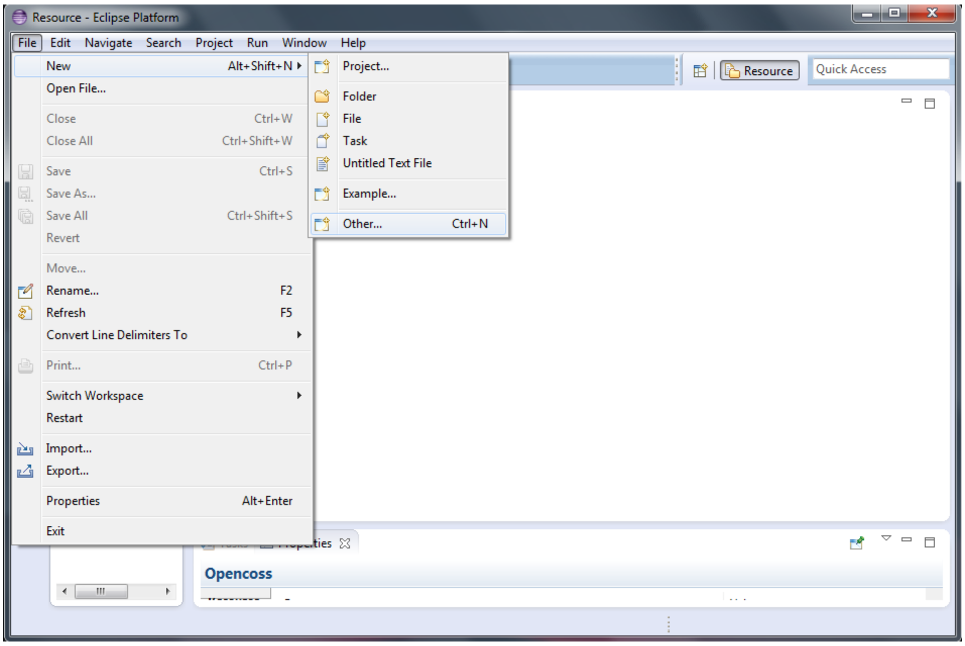
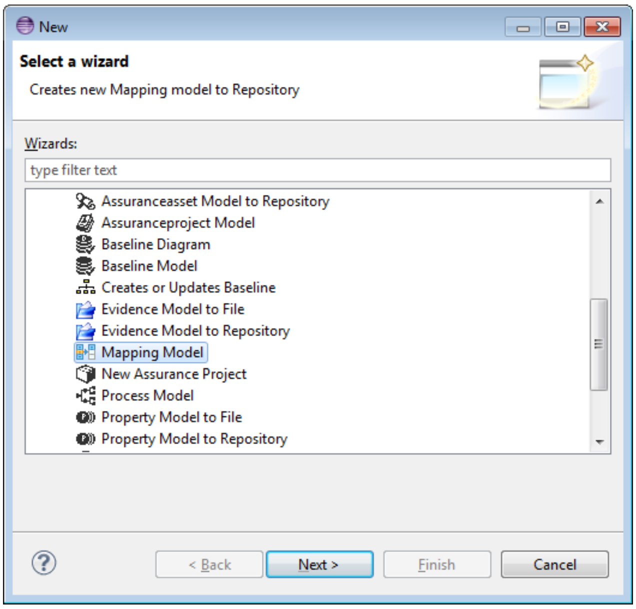


Figure 202 - New Property Model menu File -> New -> Other

- Inside the category of the wizard *Opencoss* , select the Mapping *Model* and press the *Next* button:

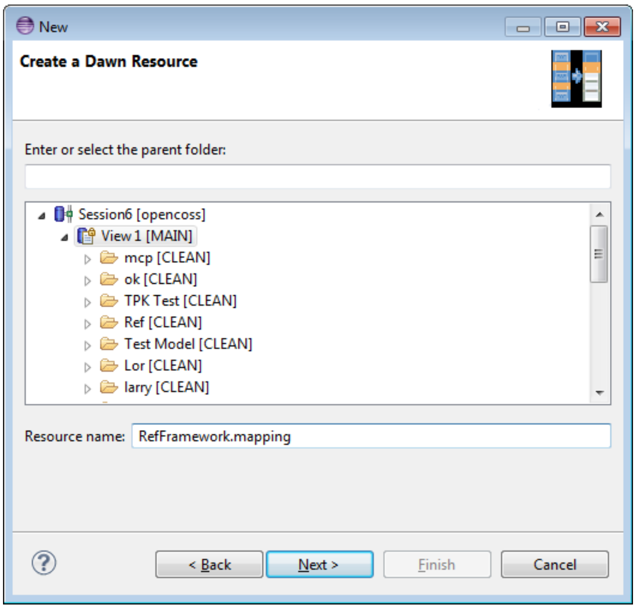

New

Select a wizard

Creates new Mapping model to Repository

Figure 203 - New Mapping Model I

- Enter o select the parent folder, the resource name and press the Next button:



New

Create a Dawn Resource

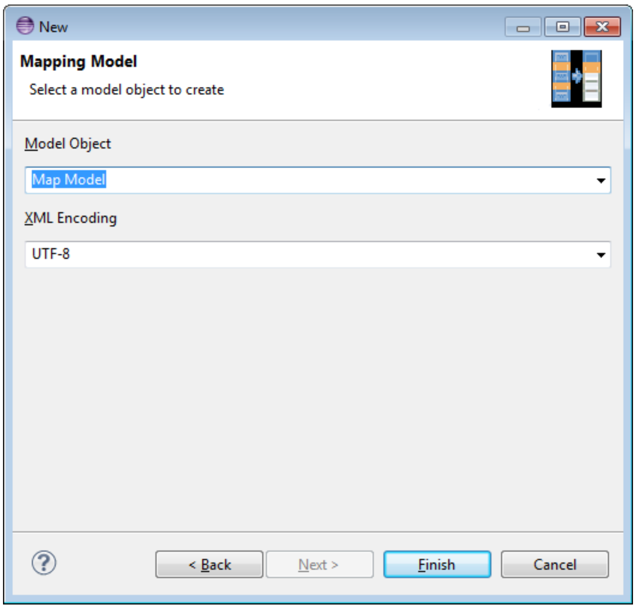
Enter or select the parent folder:

- Session6 [opencoss]
  - View 1 [MAIN]
    - mcp [CLEAN]
    - ok [CLEAN]
    - TPK Test [CLEAN]
    - Ref [CLEAN]
    - Test Model [CLEAN]
    - Lor [CLEAN]
    - larry [CLEAN]

Resource name: RefFramework.mapping

Figure 204 - New Mapping Model II

- And finally, select the “Map Model” object to create.



New

Mapping Model

Select a model object to create

Model Object: Map Model

XML Encoding: UTF-8

Figure 205 - New Mapping Model III

Once the Mapping Model has been created, the first item is presented to the user.

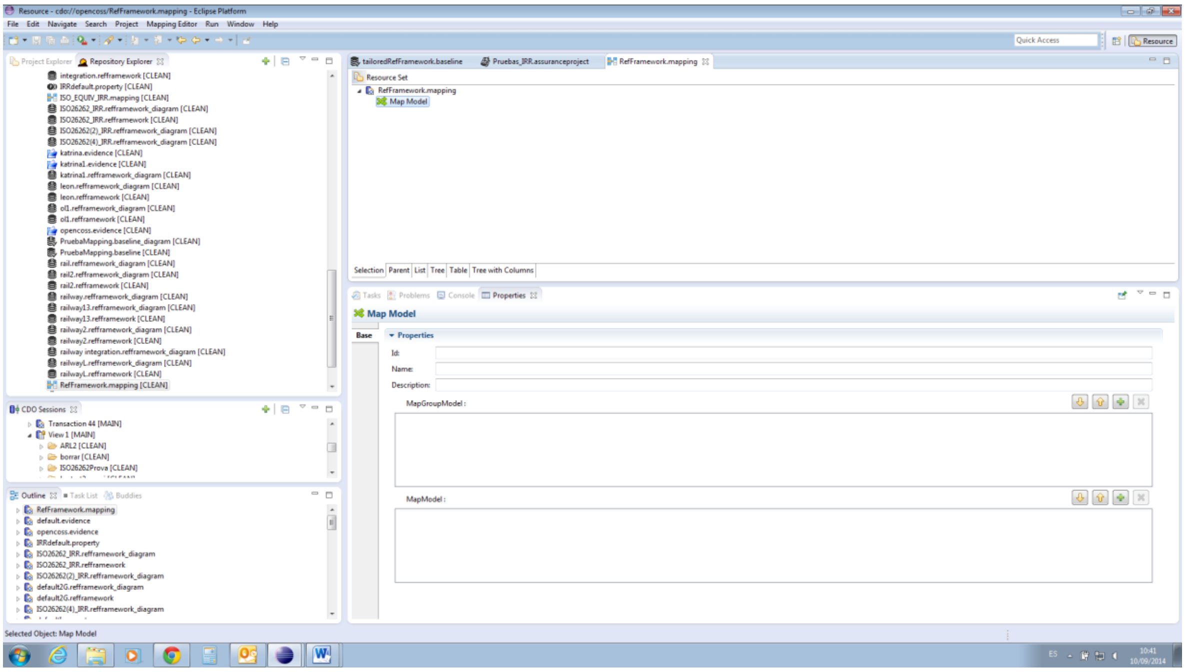

Resource - cdo://opencoss/RefFramework.mapping - Eclipse Platform
File Edit Navigate Search Project Mapping Editor Run Window Help
Project Explorer
Repository Explorer
tailoredRefFramework.baseline
Pruebas_IRR.assuranceproject
RefFramework.mapping
Resource Set
RefFramework.mapping
Map Model
Selection Parent List Tree Table Tree with Columns
CDO Sessions
Outline
Tasks Problems Console Properties
Map Model
Base
Properties
Id:
Name:
Description:
MapGroupModel :
MapModel :
Selected Object: Map Model

Figure 206 - Mapping Model

10.1 Map Group.

10.1.1 Add a map group.

It is possible to add map groups to a mapping model in two ways:

- Select the model element, press the right button of the mouse and select the contextual menu *New Child –> Map Group*

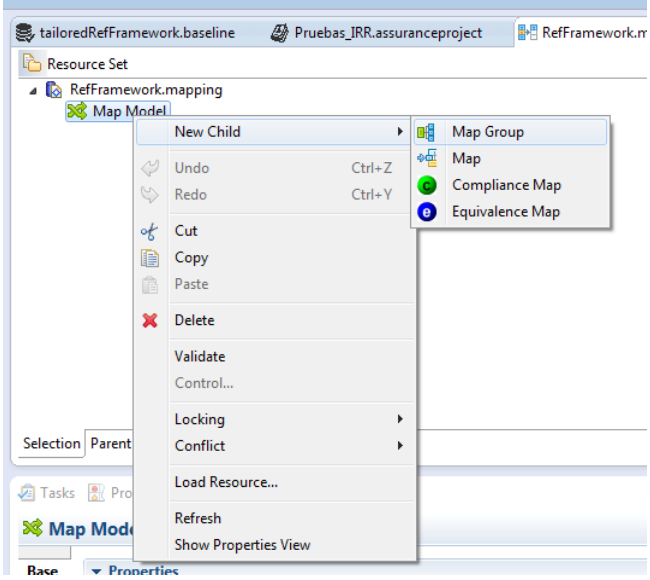


Figure 207 - Add New Map Group (I)

- Or, select the model element, and press the icon button ✚ *in the base tab*

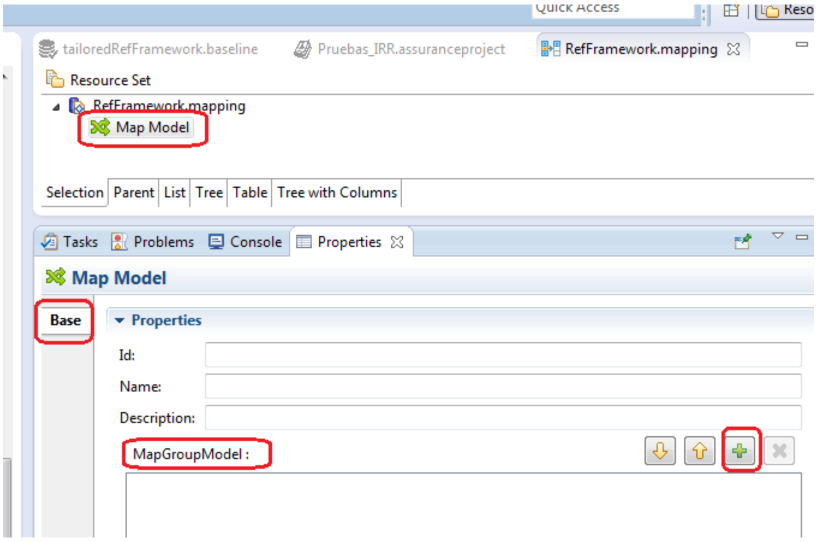


Figure 208 - Add New Map Group (II)

After these actions, in the properties zone, the framework presents several fields to describe the new map group:

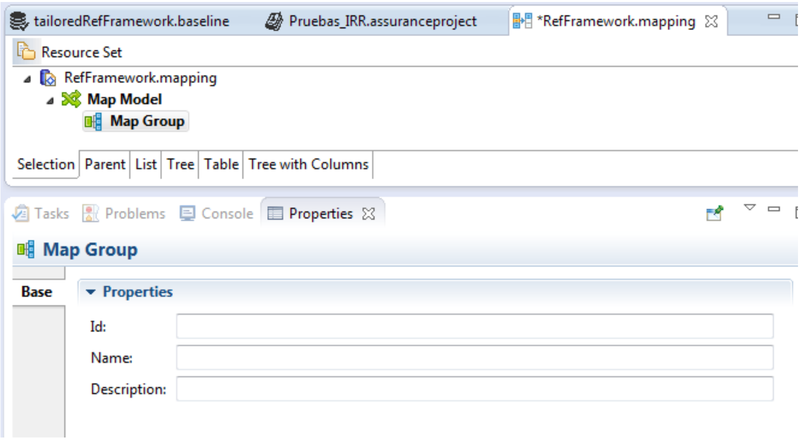


Figure 209 - Map Group properties

- Id: Map group identifier.
- Name: Map group name.
- Description: Map group description

10.1.2 Delete a map group.

To delete a map group:

- Select the map group, press the right mouse button and select the contextual menu *Delete*.

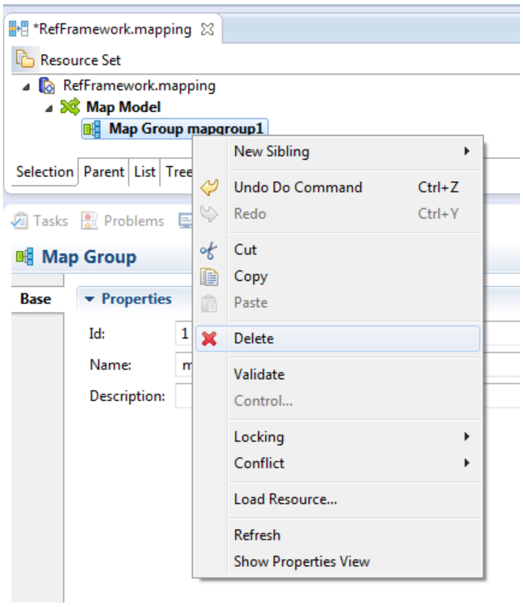


Figure 210 - Delete Map Group I.

- Or select the branch Model that contains the map group to delete, select the map group and press *the icon button* ✖

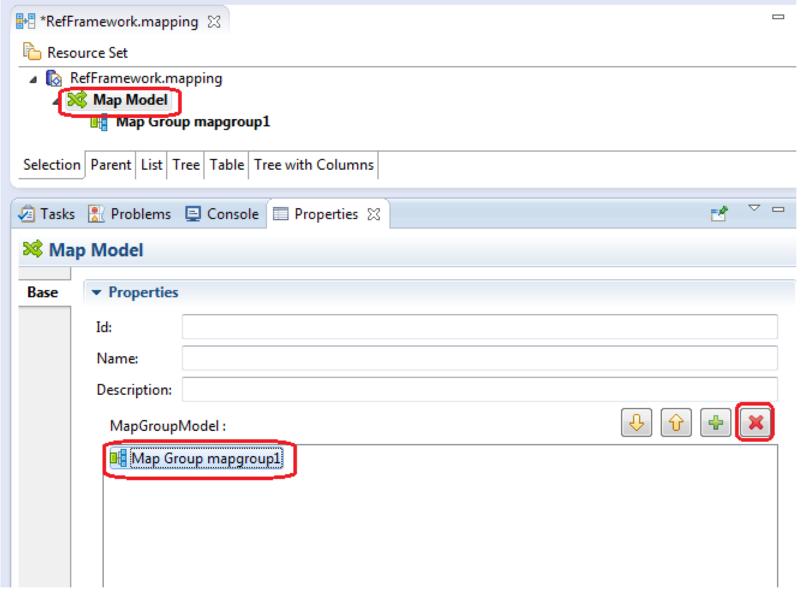


Figure 211 - Delete Map Group II.

10.2 Map.

10.2.1 Add a map.

It is possible to add maps to a mapping model in two ways:

- Select the model element, press the right button of the mouse and select the contextual menu *New Child –> Map*

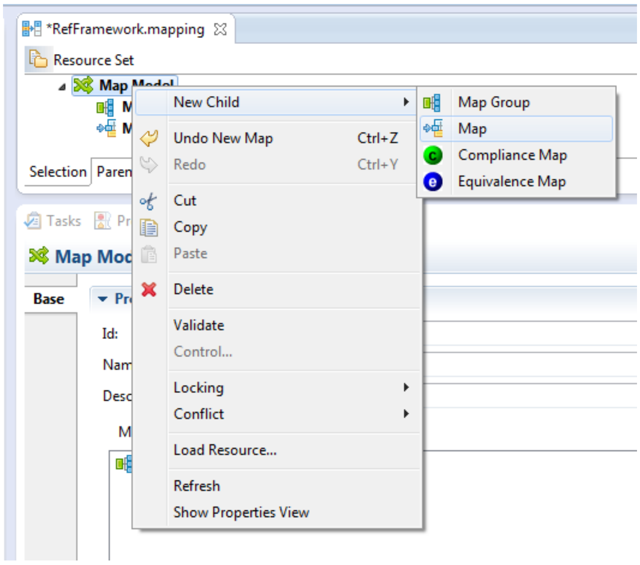


Figure 212 - Add New Map (I)

- Or, select the model element, and press the icon button + *in the base tab associated to the label Map Model:*

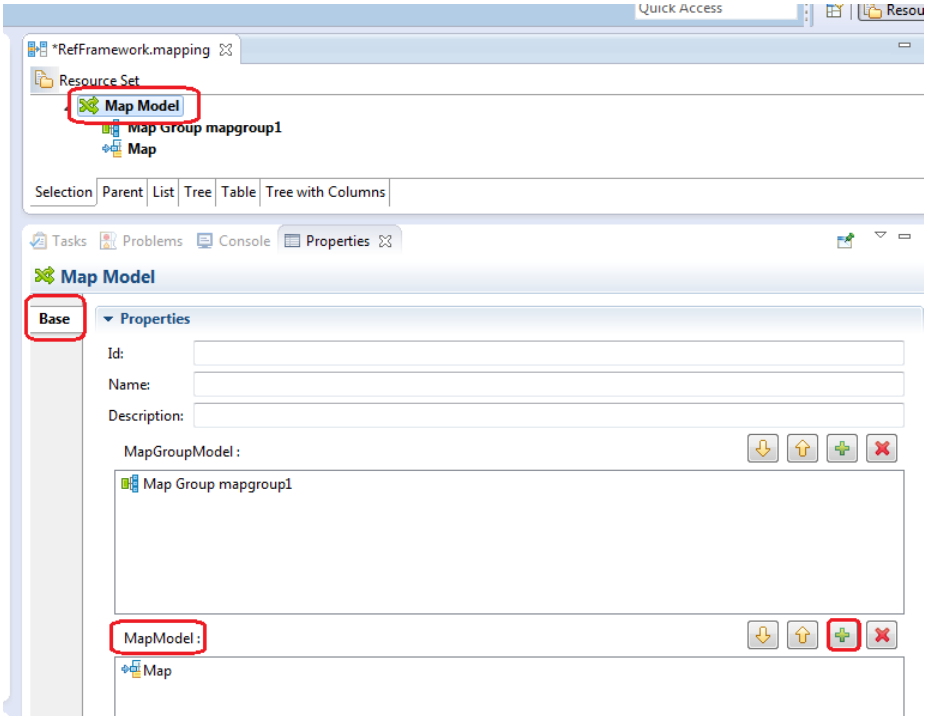
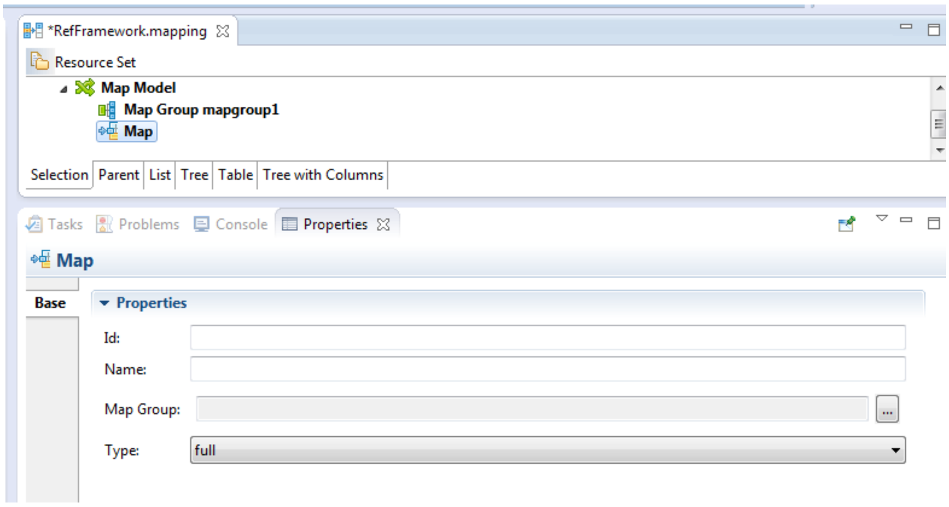


Figure 213 - Add New Map (II)

After these actions, in the properties zone, the framework presents several fields to describe the new map:



Id:

Name:

Map Group:

Type: full

Figure 214 - Map properties

- Id: Map identifier.
- Name: Map name.
- Map Group: Map Groups associated to the map.
- Type: Map type: full, partial o not map.

10.2.2 Delete a map.

To delete a map:

- Select the map, press the right mouse button and select the contextual menu Delete:

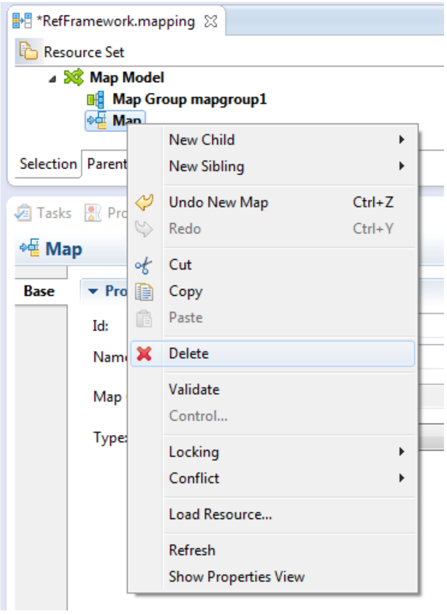


Figure 215 - Delete Map I.

- Or select the branch Model that contains the map to delete, select the map and press *the icon button* ☒ associated to the label MapModel:

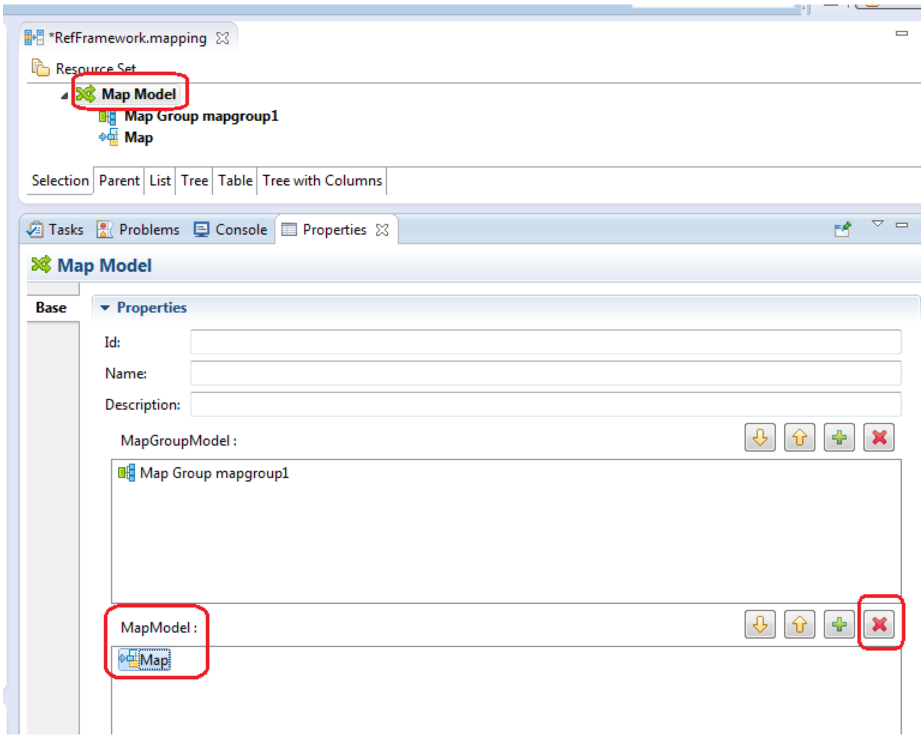


Figure 216 - Delete Map II.

11 OPENCOSS server

As described in "**Client-Server architecture**" chapter, OPENCOSS platform tools consist of:

- OPENCOSS server - installed in a central host machine.
- One or many OPENCOSS clients - each of which installed on specific user machines.

The role of the central OPENCOSS server is threefold:

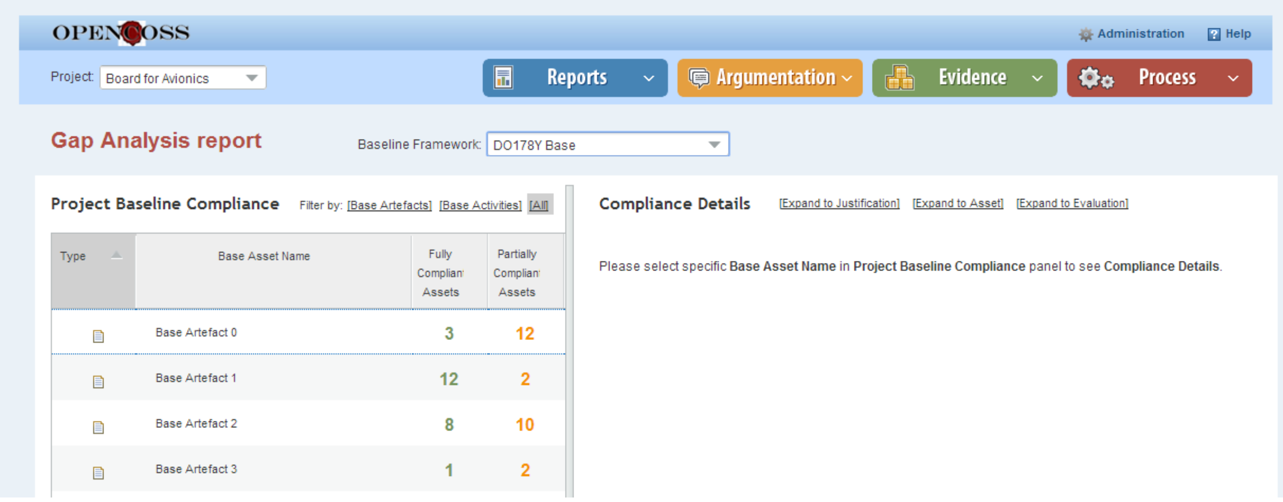
- It hosts CDO server, which facilitates a **common storage** for OPENCOSS server applications and OPENCOSS clients.
- It provides web interface with **OPENCOSS reports** presenting common storage assurance data from different angles
- It hosts **OPENCOSS API** services, e.g. evidence service or process service.

This chapter describes functionality provided by OPENCOSS server web reports - which facilitate a OPENCOSS server front-end for OPENCOSS platform users.

11.1 OPENCOSS Web interface layout

OPENCOSS server web pages are served at 8080 port by default.
In order to view the web pages, please run your web browser and go to the following location:

http://<OPENCOSS-SERVER-HOST-NAME>:8080/


OPENCOSS
Administration
Help
Reports
Argumentation
Evidence
Process
Filter by: [Base Artefacts] [Base Activities] [All]
[Expand to Justification] [Expand to Asset] [Expand to Evaluation]

Project: Board for Avionics

Gap Analysis report

Baseline Framework: DO178Y Base

Project Baseline Compliance

Type	Base Asset Name	Fully Complian Assets	Partially Complian Assets
	Base Artefact 0	3	12
	Base Artefact 1	12	2
	Base Artefact 2	8	10
	Base Artefact 3	1	2

Compliance Details

Please select specific **Base Asset Name** in **Project Baseline Compliance** panel to see **Compliance Details**.

Figure 217 - Web interface layout

A typical OPENCOSS server web page consists of the following panels:

- Top panel
  It contains links to User Manual documents and links to server administration pages.
- Project and Menu panel
  It contains:
  - A select box with assurance projects which have been created in OPENCOSS platform.
  - Main menu with links to OPENCOSS server reports.
    There are several reports presenting analytical view from assurance data stored in OPENCOSS platform.

Each of the reports is described in the subsequent chapters.

- Main panel

  It presents the main content of the page - depending on the current report or page selected from the menu and the given assurance project.

11.2 Compliance report

11.2.1 Goal of the report

Compliance report provides extensive functionality which helps OPENCOSS platform users to assess the current **compliance** of their project **to the selected safety standard** (i.e., baseline).
The functionality is intended to be used by:

- Project **team members**, for example developers, when the project is in progress, in order to have up-to-date insights into which of the baseline framework items are already satisfied and to what extent.
- Project **safety manager** in order to monitor the project general compliance, observe the compliance details and add, assign, or un-assign specific evidence resources to/from the given requirement of the safety standard which is followed by the project.
- Independent **safety assessor**, when the project draws to an end, in order to browse the assigned safety evidence, evaluate it and independently assess the actual project compliance to the specific safety standard.

Two modes of the report can be distinguished:

- An **interactive mode**, where user can actively browse the report, select the specific baseline items, view their properties, their compliance mapping, and the associated evidence, and add or remove the evidence resources mapped to the specific baseline element.
- A **printer** friendly **report** - which is a textual output presenting all the information of the current compliance of the selected project.

The compliance report can be accessed via the following OPENCOSS web server menu item.

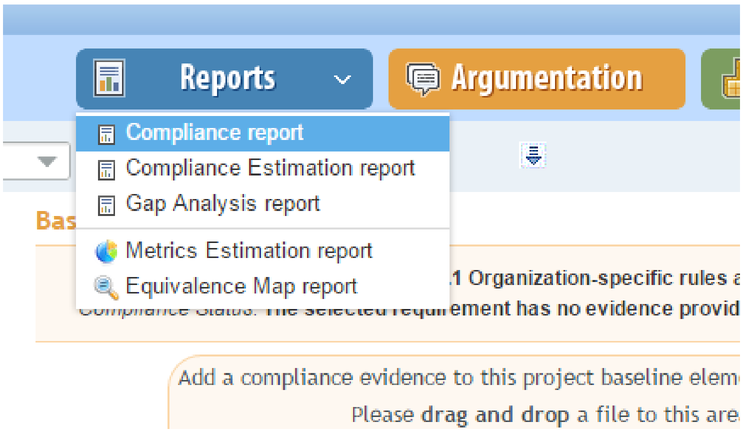
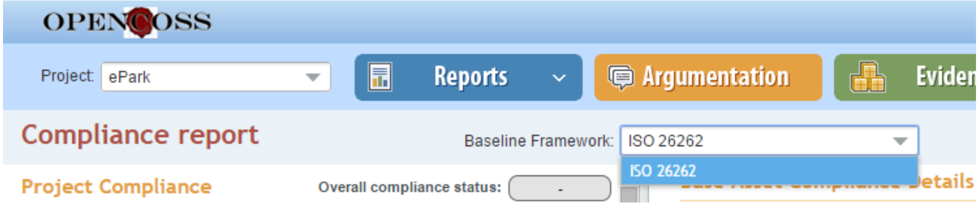

Reports
Argumentation
Compliance report
Compliance Estimation report
Gap Analysis report
Metrics Estimation report
Equivalence Map report
Bas
.1 Organization-specific rules a
Compliance Status: The selected requirement has no evidence provid
Add a compliance evidence to this project baseline elem
Please drag and drop a file to this are

Figure 218 - Menu item directing to "Compliance report"

11.2.2 Viewing compliance data on the report

The compliance report allow users to see the overall compliance of the selected project to the specific safety standard.

When a specific OPENCOSS assurance project is selected in the top panel, its defined baselines are presented in the middle panel select box.



Project: ePark

Compliance report

Baseline Framework: ISO 26262

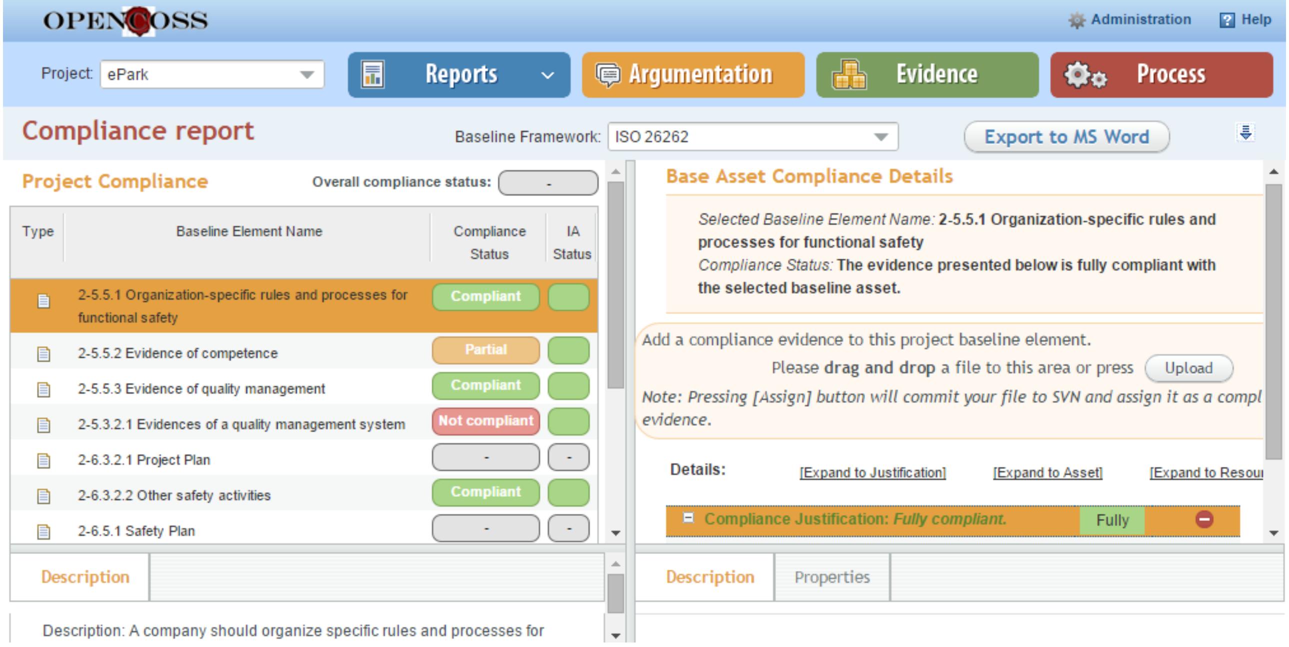
ISO 26262

Project Compliance

Overall compliance status: -

Figure 219 - Baseline Frameworks combo box for the specific project

The report data section is divided into 4 panels.



Project: ePark

Compliance report

Baseline Framework: ISO 26262

Project Compliance

Overall compliance status: -

Type	Baseline Element Name	Compliance Status	IA Status
	2-5.5.1 Organization-specific rules and processes for functional safety	Compliant	
	2-5.5.2 Evidence of competence	Partial	
	2-5.5.3 Evidence of quality management	Compliant	
	2-5.3.2.1 Evidences of a quality management system	Not compliant	
	2-6.3.2.1 Project Plan	-	-
	2-6.3.2.2 Other safety activities	Compliant	
	2-6.5.1 Safety Plan	-	-

Description: A company should organize specific rules and processes for

Base Asset Compliance Details

Selected Baseline Element Name: **2-5.5.1 Organization-specific rules and processes for functional safety**
Compliance Status: **The evidence presented below is fully compliant with the selected baseline asset.**

Add a compliance evidence to this project baseline element.

Please **drag and drop** a file to this area or press

Note: Pressing [Assign] button will commit your file to SVN and assign it as a compl evidence.

Details: [Expand to Justification] [Expand to Asset] [Expand to Resou

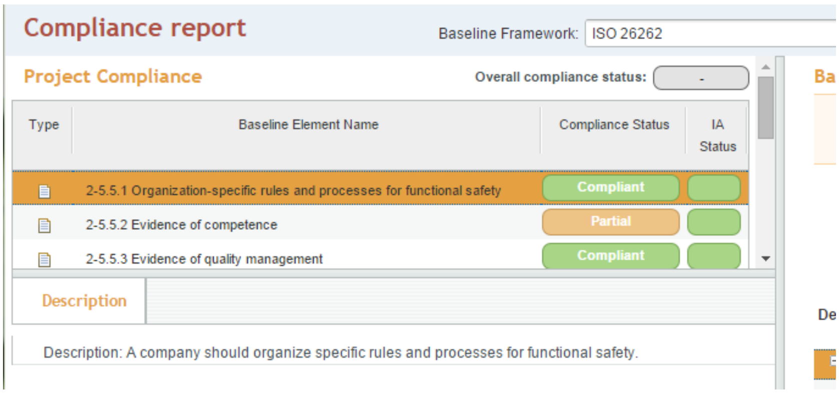
Compliance Justification: *Fully compliant.* Fully

Figure 220 - 4 panels of "Compliance report"

The “**Project Compliance**” table, which is placed in the left, presents base artefacts and base activities of the selected safety standard. The most important column is the “**Compliance Status**” one, which presents the overall compliance status of a project to the specific safety standard item. The column can be sorted by value, thus allowing user to assess the project compliance at one glance.
In case base activities or base artefacts are defined to have a parent-child hierarchy, this relation is presented accordingly in a tree structure of the table.

Note:
“IA Status” column presents the current status of specific baseline element from Impact Analysis point of view. This functionality has been described in a separate chapter: Impact Analysis result presentation on OPENCOSS server reports.

When a specific baseline element item (i.e. table row) is selected, its description and properties, as defined in OPENCOSS storage, are presented in the bottom-left panel.



Compliance report

Baseline Framework: ISO 26262

Project Compliance

Overall compliance status: -

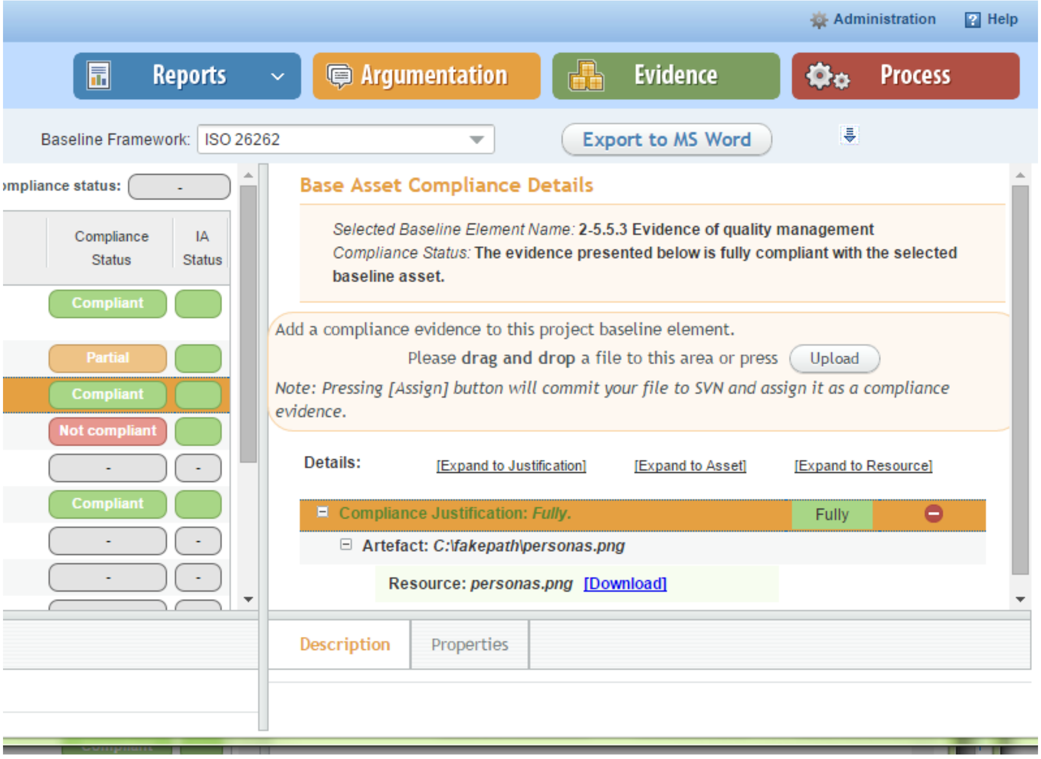
Type	Baseline Element Name	Compliance Status	IA Status
	2-5.5.1 Organization-specific rules and processes for functional safety	Compliant	
	2-5.5.2 Evidence of competence	Partial	
	2-5.5.3 Evidence of quality management	Compliant	

Description

Description: A company should organize specific rules and processes for functional safety.

Figure 221 - Description of the selected baseline element presented at the bottom panel

Upon the selection of the specific safety standard item in the "**Project Compliance**" table on the left of the screen, the compliance mapping details are presented in the "**Base Asset Compliance Details**" panel at the right side of the page.



Baseline Framework: ISO 26262

mpliance status: -

Compliance Status	IA Status
Compliant	
Partial	
Compliant	
Not compliant	
-	-
Compliant	
-	-
-	-

Base Asset Compliance Details

Selected Baseline Element Name: **2-5.5.3 Evidence of quality management**
Compliance Status: **The evidence presented below is fully compliant with the selected baseline asset.**

Add a compliance evidence to this project baseline element.
Please **drag and drop** a file to this area or press Upload
Note: Pressing [Assign] button will commit your file to SVN and assign it as a compliance evidence.

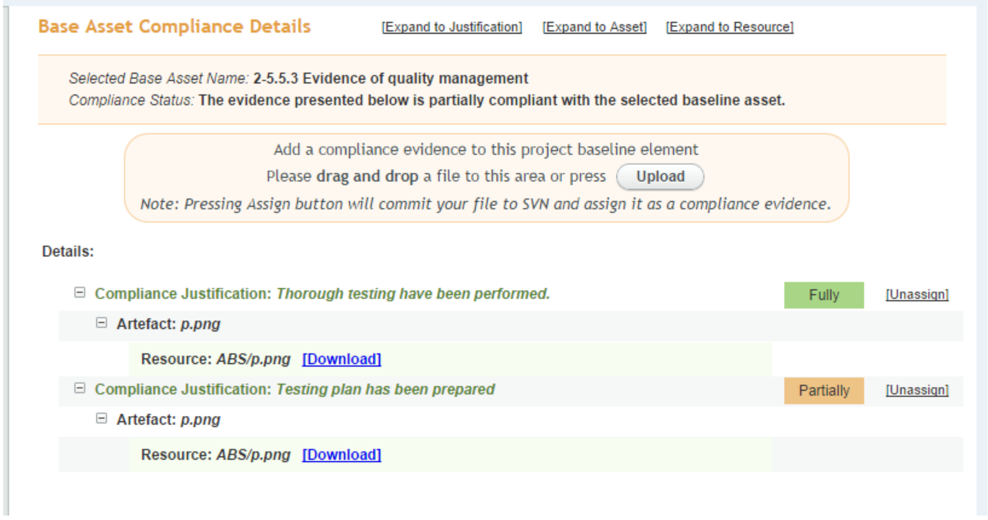
Details: [Expand to Justification] [Expand to Asset] [Expand to Resource]

⊟ Compliance Justification: *Fully.* Fully
⊟ Artefact: *C:\fakepath\personas.png*
Resource: *personas.png* [Download]

Figure 222 - Details of Justification and mapped evidence

The extensive compliance information is presented, including:

- **Compliance justification** explanation (as specified in OPENCOSS client editor or on this report).
- For the specific justification: the **associated artefact** or **activity**.
- For the specific artefact, its associated evidence **resource files**. These resource files are committed to the appropriate **SVN repository**. Users can press the ***[Download]*** link next to each resource tree node in order to download the specific file from the SVN and view it.



Base Asset Compliance Details [Expand to Justification] [Expand to Asset] [Expand to Resource]

Selected Base Asset Name: 2-5.5.3 Evidence of quality management
Compliance Status: The evidence presented below is partially compliant with the selected baseline asset.

Add a compliance evidence to this project baseline element
Please **drag and drop** a file to this area or press Upload
Note: Pressing Assign button will commit your file to SVN and assign it as a compliance evidence.

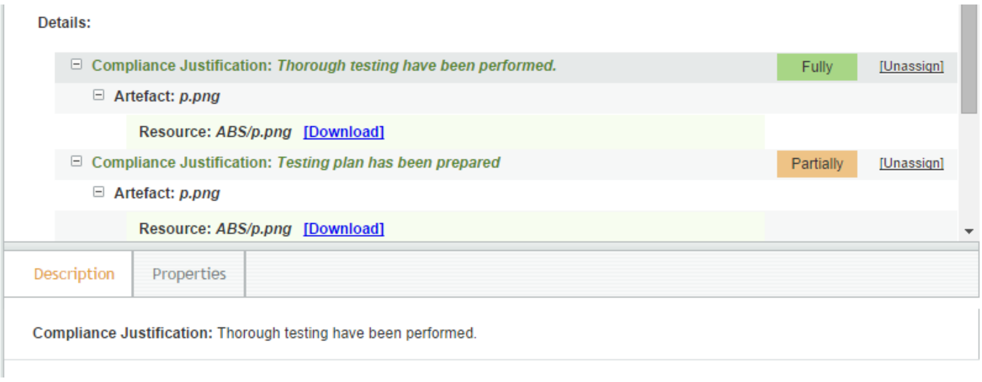
Details:

⊟ Compliance Justification: *Thorough testing have been performed.* Fully [Unassign]
⊟ Artefact: *p.png*
Resource: *ABS/p.png* [Download]
⊟ Compliance Justification: *Testing plan has been prepared* Partially [Unassign]
⊟ Artefact: *p.png*
Resource: *ABS/p.png* [Download]

Figure 223 - Compliance evidence of the specific baseline asset

The above tree can be expanded or collapsed quickly to the desired level by pressing buttons above it, allowing tailoring the presented details to the level needed by a user at a given moment.

When any of the above tree levels is selected (justification, artefact, or resource), its description and properties are presented in the right-bottom panel of the report.



Details:

⊟ Compliance Justification: *Thorough testing have been performed.* Fully [Unassign]
⊟ Artefact: *p.png*
Resource: *ABS/p.png* [Download]
⊟ Compliance Justification: *Testing plan has been prepared* Partially [Unassign]
⊟ Artefact: *p.png*
Resource: *ABS/p.png* [Download]

Description | Properties

Compliance Justification: Thorough testing have been performed.

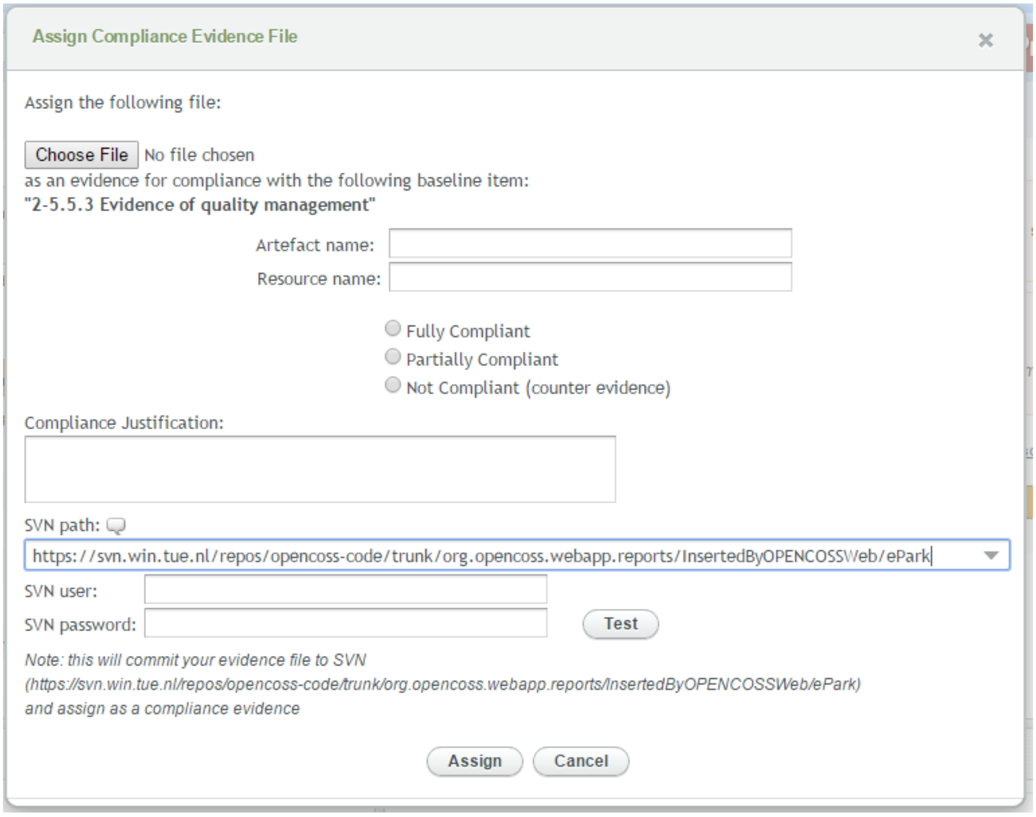
Figure 224 - Specific evidence details description presented at the bottom

11.2.3 Adding evidence and compliance data

Additionally to browsing the project evidence pieces, the report allows users to **add, modify and remove evidence** resources and **define a compliance mapping**.

"**Base Asset Compliance Details**" panel on the right-hand side of the report contains an **Upload** panel which allows users to add a specific file resource (containing the evidence), specify the associated artefact and define compliance justification text and its type.

After user presses the upload button or drag and drops the file resource to the panel, the following "**New Resource Definition**" dialog appears:



Assign Compliance Evidence File

Assign the following file:

Choose File No file chosen
as an evidence for compliance with the following baseline item:
"2-5.5.3 Evidence of quality management"

Artefact name:
Resource name:

○ Fully Compliant
○ Partially Compliant
○ Not Compliant (counter evidence)

Compliance Justification:

SVN path: https://svn.win.tue.nl/repos/opencoss-code/trunk/org.opencoss.webapp.reports/InsertedByOPENCOSSWeb/ePark

SVN user:
SVN password: Test

Note: this will commit your evidence file to SVN (https://svn.win.tue.nl/repos/opencoss-code/trunk/org.opencoss.webapp.reports/InsertedByOPENCOSSWeb/ePark) and assign as a compliance evidence

Assign Cancel

Figure 225 - A window allowing to assign and describe evidence to the given baseline item

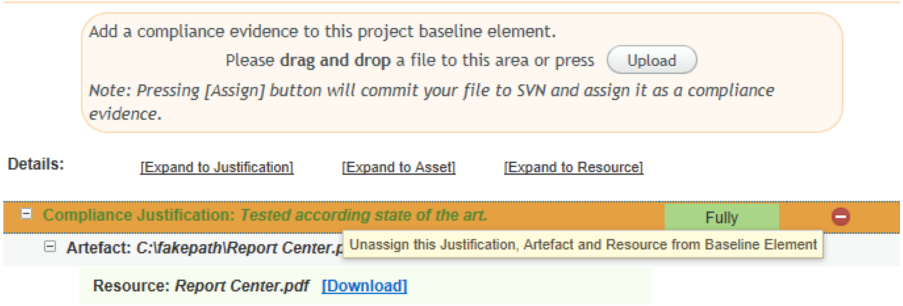
User can enter the desired **compliance justification** in the text area, change the names to be created (default names are suggested) and define the **compliance mapping type**.

Additionally it is possible to specify a **SVN URL** location where the evidence file will be committed. User has a possibility to add new location or select already defined one from the select-box.

After pressing **Assign** button, the following actions are performed by the OPENCOSS platform:

- The resource file gets **committed to** the given **SVN** repository so that it is securely stored and can be retrieved on demand.
- A **resource** CCL object (associated with the above file) is created with the specific name.
- An **artefact** CCL object (associated with the specific resource) gets created.
- A **compliance justification**, which maps the artefact to the selected baseline framework items, gets created in OPENCOSS storage.

Additionally, there are [**Modify**] and [**Unassign**] buttons, which allow user to update or revoke the evidence file and compliance mapping created above.



Add a compliance evidence to this project baseline element.

Please **drag and drop** a file to this area or press Upload

Note: Pressing [Assign] button will commit your file to SVN and assign it as a compliance evidence.

Details: [Expand to Justification] [Expand to Asset] [Expand to Resource]

Compliance Justification: *Tested according state of the art.* Fully

Artefact: *C:\fakepath\Report Center.p* Unassign this Justification, Artefact and Resource from Baseline Element

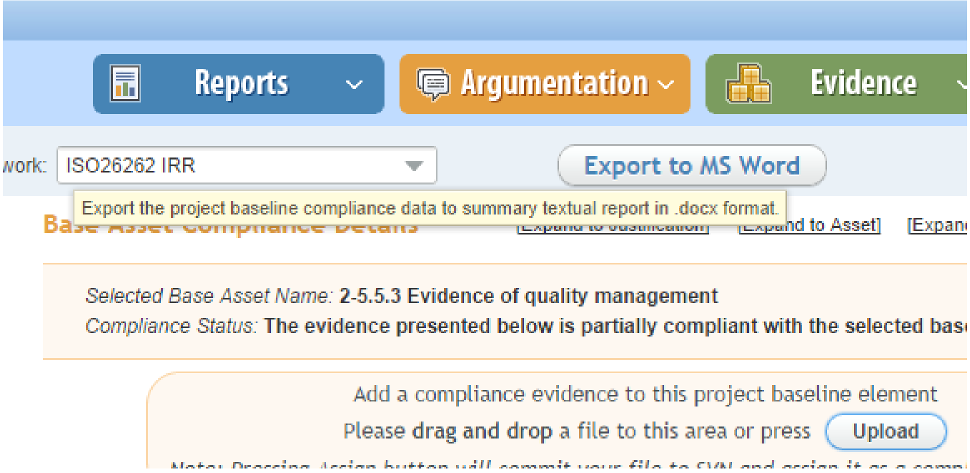
Resource: *Report Center.pdf* [Download]

Figure 226 - Unassign button allowing to disassociate evidence from the given baseline item

11.2.4 Generation of summary textual report

The **interactive mode** presented in the preceding chapters is very comfortable for users to browse and filter data, and view their details. Upon each user selection, appropriate details are presented.
However, there is often a need to **generate an overall report**, containing **all the information** visualized in one place.
This can be easily done using **Export to MS Word** button.
Upon pressing it, a default an docx template report gets filled with the **all the Compliance report data** presented for the specific safety project.

Note for OPENCOSS administrators:
The template docx used for textual report generation can be changed on OPENCOSS server side in order to adjust it the given company standards.



work: ISO26262 IRR

Export the project baseline compliance data to summary textual report in .docx format.

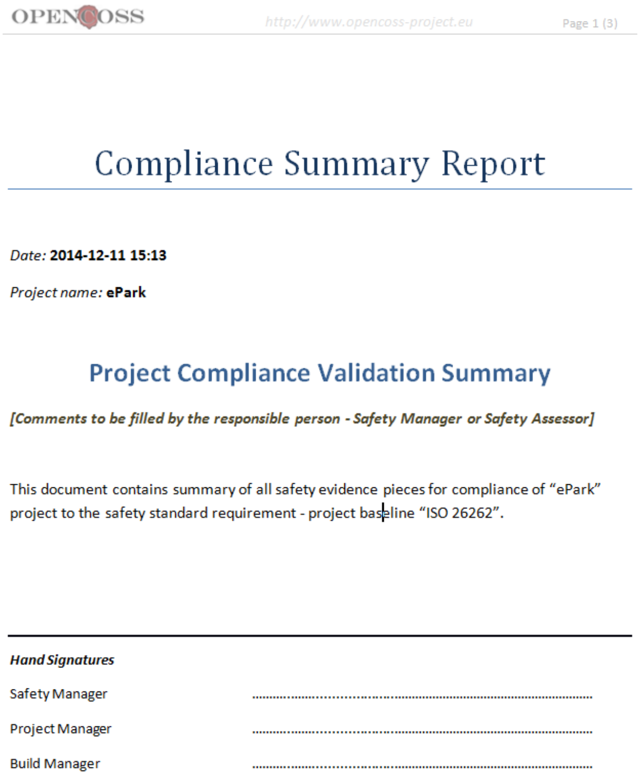
Base Asset Compliance Details

Selected Base Asset Name: 2-5.5.3 Evidence of quality management
Compliance Status: The evidence presented below is partially compliant with the selected bas

Add a compliance evidence to this project baseline element
Please drag and drop a file to this area or press Upload

Figure 227 - "Export to MS Word" button which generates textual overall detailed report of Project Compliance to the safety standard

The textual report can then be **printed to pdf or on paper**, signed digitally or manually, and stored for future reference.



OPENCOSS http://www.opencoss-project.eu Page 1 (3)

Compliance Summary Report

Date: **2014-12-11 15:13**

Project name: **ePark**

Project Compliance Validation Summary

[Comments to be filled by the responsible person - Safety Manager or Safety Assessor]

This document contains summary of all safety evidence pieces for compliance of "ePark" project to the safety standard requirement - project baseline "ISO 26262".

Hand Signatures

Safety Manager ....

Project Manager ....

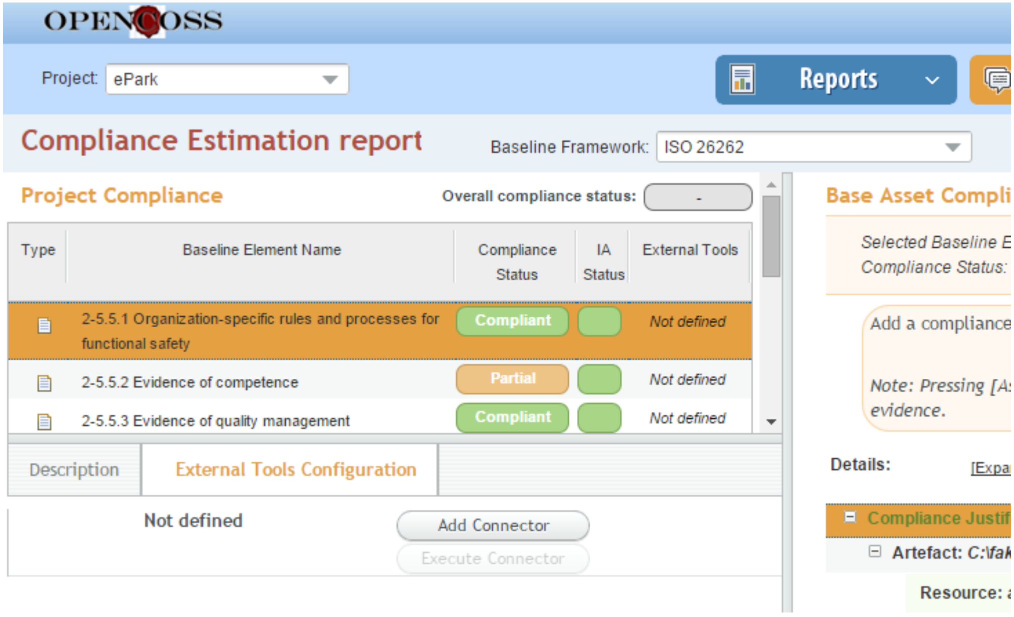
Build Manager ....

Figure 228 - First page of the generated textual report

11.3 Compliance Estimation report

Compliance Estimation report is an enhanced version of the Compliance report as it additionally provides "**External tool**" connectors functionality.

There is "**External Tools**" column presented in the Project Compliance table.



Project: ePark

Compliance Estimation report

Baseline Framework: ISO 26262

Project Compliance

Overall compliance status: -

Type	Baseline Element Name	Compliance Status	IA Status	External Tools
🗎	2-5.5.1 Organization-specific rules and processes for functional safety	Compliant	🟩	Not defined
🗎	2-5.5.2 Evidence of competence	Partial	🟩	Not defined
🗎	2-5.5.3 Evidence of quality management	Compliant	🟩	Not defined

Not defined

Base Asset Compli

Selected Baseline E
Compliance Status:

Add a compliance

Note: Pressing [A
evidence.

Details: [Expa

Compliance Justif

Artefact: C:\fak

Resource: a

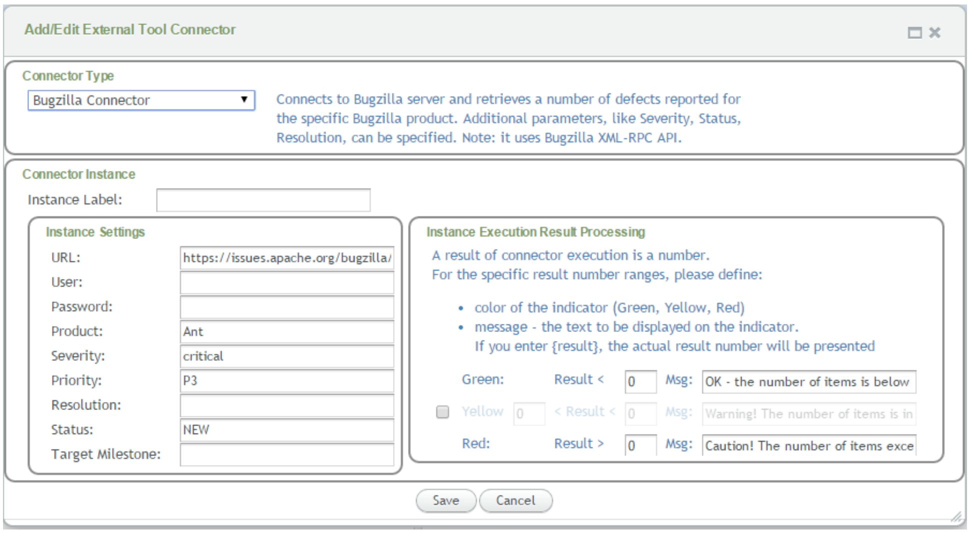
Figure 229 - External Tool connector - column on the report and bottom panel

External Tool Connector is a module which is capable of **connecting to the defined external** tool (e.g. DOORS, JIRA or Bugzilla which may store the project evidence items), send a **query** to the tool and present **up-to-date result** returned.

External tool connector can be specified **for the given baseline element** of the safety standard.

For example, if the baseline item says that all the requirements implemented should be tested, a connector to corporate Bugzilla could be added (where the company stores their requirement definitions and their statuses). The connector could query the Bugzilla to learn how many requirements are there with a status marked as Not Tested.

In order to specify a connector for the selected baseline element, [**Add Connector**] button should be pressed. It presents a connector settings window:



Add/Edit External Tool Connector

Connector Type

Bugzilla Connector ▾

Connects to Bugzilla server and retrieves a number of defects reported for the specific Bugzilla product. Additional parameters, like Severity, Status, Resolution, can be specified. Note: it uses Bugzilla XML-RPC API.

Connector Instance

Instance Label:

Instance Settings

URL:	https://issues.apache.org/bugzilla/
User:	
Password:	
Product:	Ant
Severity:	critical
Priority:	P3
Resolution:	
Status:	NEW
Target Milestone:	

Instance Execution Result Processing

A result of connector execution is a number.
For the specific result number ranges, please define:

- color of the indicator (Green, Yellow, Red)
- message - the text to be displayed on the indicator.
  If you enter {result}, the actual result number will be presented

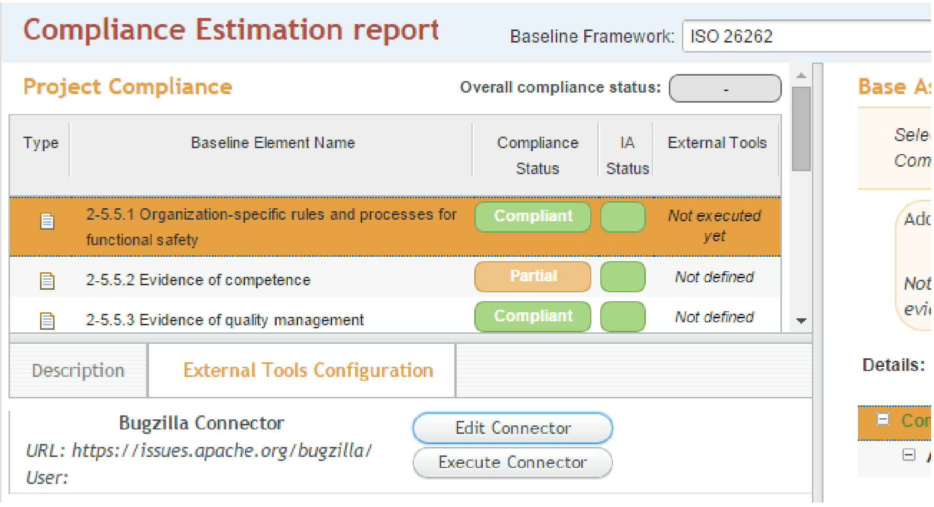
	Green:	Result <	0	Msg:	OK - the number of items is below
□	Yellow	0	< Result < 0	Msg:	Warning! The number of items is in
	Red:	Result >	0	Msg:	Caution! The number of items exce

Figure 230 - Add/Edit connector settings window

A connector to Bugzilla tool has been implemented as a proof of concept. Additional connectors can be implemented in future release of OPENCOSS platform.

The **connector settings** are grouped into 2 sections:

- **Instance Settings** - it specifies the external tool connection and the query parameters
- **Instance Execution Result Processing** - it specifies the thresholds for the value retuned by the connector querying the external tool. Three value ranges can be defined, for each range green, yellow or red colour would be presented on the report respectively. User can additionally define message for the specific value range.



Compliance Estimation report

Baseline Framework: ISO 26262

Project Compliance

Overall compliance status: -

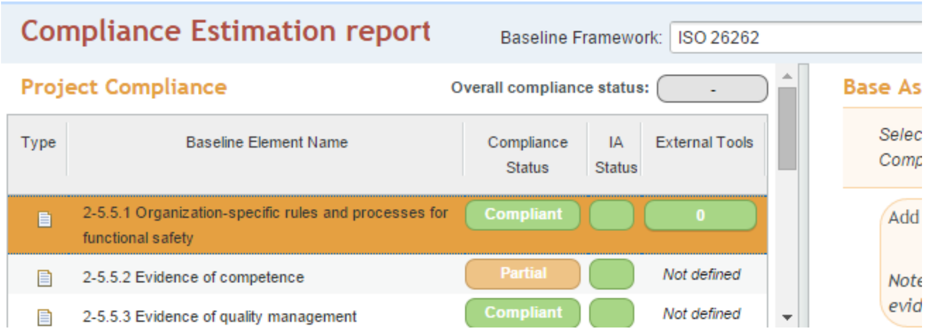
Type	Baseline Element Name	Compliance Status	IA Status	External Tools
🗎	2-5.5.1 Organization-specific rules and processes for functional safety	Compliant	🟩	Not executed yet
🗎	2-5.5.2 Evidence of competence	Partial	🟩	Not defined
🗎	2-5.5.3 Evidence of quality management	Compliant	🟩	Not defined

Description | External Tools Configuration

Bugzilla Connector
URL: https://issues.apache.org/bugzilla/
User:

Figure 231 - The report layout after connector has been defined but not executed yet.

Pressing [**Execute Connector**] button triggers the connector to query the external tool and render the result on the report.



Compliance Estimation report

Baseline Framework: ISO 26262

Project Compliance

Overall compliance status: -

Type	Baseline Element Name	Compliance Status	IA Status	External Tools
🗎	2-5.5.1 Organization-specific rules and processes for functional safety	Compliant	🟩	0
🗎	2-5.5.2 Evidence of competence	Partial	🟩	Not defined
🗎	2-5.5.3 Evidence of quality management	Compliant	🟩	Not defined

Figure 232 - The external tool connector has been executed and the value returned is 0

To sum up, **External tools connectors** are modules which can be defined to connect to external tools and present numerical result from a defined data query.
The result is presented on the **Compliance Estimation** report. This way, the report users have **up-to-date numeric status** regarding their evidence items stored in the external tools.
This functionality can be used when the project is in progress (in contrary to the phase when the projects is finishing and is evaluated for compliance) to facilitate automated up-to-date external evidence status presentation.

11.4 Change Impact Analysis

OPENCOSS platform facilitates a prototype of Change Impact Analysis algorithm implementation.
It is triggered when any artefact stored in OPENCOSS database is modified by the user. The algorithm traverses all the related artefacts in order to check if they should be marked as affected by the change, depending on the artefact relation type.

11.4.1 Change Impact Analysis in OPENCOSS Client

OPENCOSS Eclipse client editor is the main OPENCOSS tool where user adds, modifies, removes artefacts and relations between them. Similarly it is the place where Impact Analysis algorithm is triggered when any artefact is changed. Similarly the IA results are presented there.
This has been described in Impact analysis section.

11.4.2 Change Impact Analysis algorithm

This chapter presents technical details describing how IA algorithm traverses relations between artefacts.

The main pieces of information used by the IA engine are relations between Artefacts objects stored in *ArtefactRel* CCL entity.

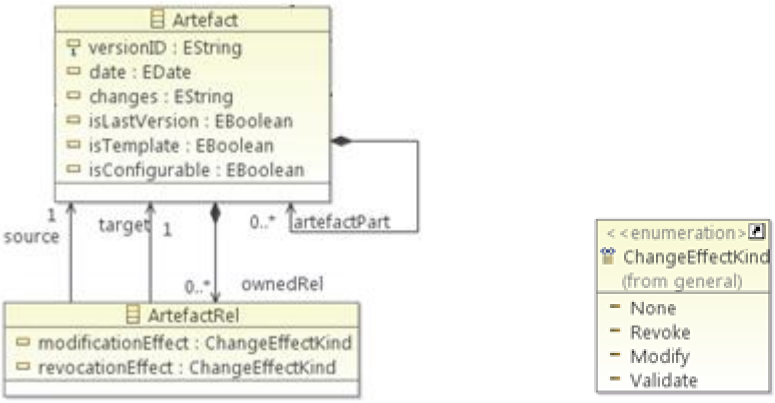


Figure 233 - Artefact Model

Two Artefacts are considered related when there is an *ArtefactRel* instance pointing to one of them as a source and another of them as a target. Please note that *ArtefactRel* has *modificationEffect* and *revocationEffect* attributes.

Note: An ArtefactRel object for specific two artefacts can be added in the following ways:
○ A user can add this entity manually in the Evidence Editor of OPENCOSS platform client
○ ArtefactRel entity is added automatically when a parent-child relation is established between two artefacts. When adding artefactPart to parentArtefact, a new ArtefactRel object is created, with modificationEffect=MODIFY and revocationEffect=MODIFY, *source* pointing to parentArtefact and *target* to artefactPart.

It has been arranged that a direction of analysis flow is the following: *ArtefactRel* "*target* affects the *source*". When impact analysis is started:
○ It starts from *artefactCDOId* for the specific *EventKind* (either *Modify* or *Revoke*),
○ It looks into the related *ArtefactRel* (for which the *artefactCDOId* is a *target*) object
○ It traverses to the artefact pointed by *ArtefactRel source*
○ Depending on the initial *EventKind* (either *Modify* or *Revoke*), it takes the value of *modificationEffect* or *revocationEffect* from the *ArtefactRel* and assumes the appropriate *AssuranceAssetEvent* on the reached source artefact.

For example, let's assume that there are the following *Artefact* and *ArtefactRel* dependencies:
ArtefactA ---- ArtefactRelA(ModificationEffect:MODIFY, RevocationEffect:REVOKE) ---> ArtefactB
ArtefactB ---- ArtefactRelB(ModificationEffect:REVOKE, RevocationEffect:REVOKE) ---> ArtefactC
ArtefactC ---- ArtefactRelC(ModificationEffect:MODIFY, RevocationEffect:VALIDATE) ---> ArtefactD

ArtefactD ---- ArtefactRelD(ModificationEffect:MODIFY, RevocationEffect:REVOKE) ---> ArtefactE

○ The engine starts with *EventKind.MODIFICATION* for *ArtefactA* and navigates via *ArtefactRelA* to *ArtefactB* and because *ArtefactRelA:ModificationEffect* equals *MODIFY*, it reaches *ArtefactB* with *EventKind.MODIFICATION* change effect.

Note: this change effect event is not saved in storage yet. Now it is only used for further traversal, and will be returned as part of the result of *listArtefactsRelationImpacts()* method.

○ The engine continues from ArtefactB with EventKind.MODIFICATION and navigates to ArtefactC and because *ArtefactRelB:ModificationEffect* equals REVOKE, it reaches *ArtefactC* with *EventKind.REVOKE* change effect.

○ The engine continues from *ArtefactC* with *EventKind.REVOCATION* and traversal path ends here because of *ArtefactRelC:RevocationEffect* equals *VALIDATE*.

○ Thus the result is:

- *ArtefactRelA - ModificationEffect.MODIFY*
- *ArtefactRelB - ModificationEffect.REVOKE*

Above algorithm affects the Artefact lifecycle. States of this lifecycle are presented on the figure below.

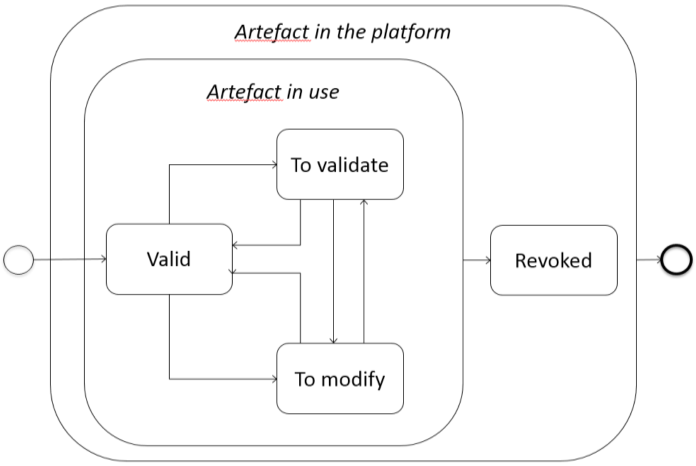


Figure 234 - Artefact lifecycle from the IA point of view

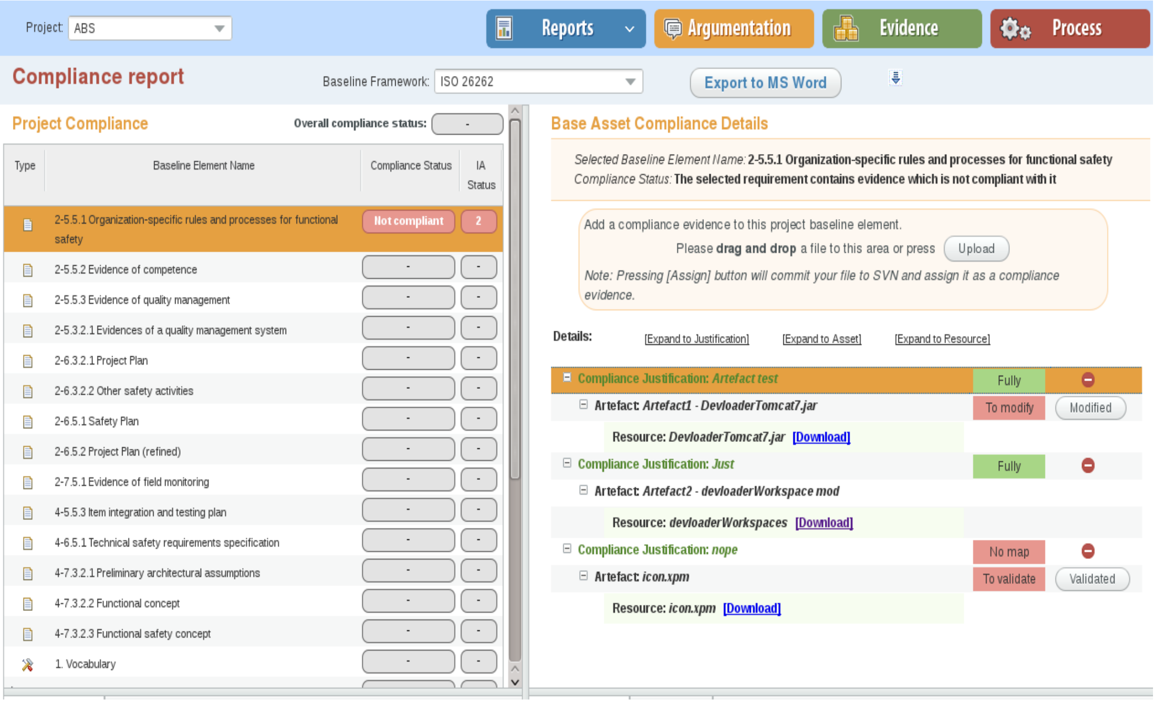
Some of these states require action from user – like “To validate” and “To modify”. To address some restrictions of CCL these two states are recognized by the presence of given event date or lack of it. This signals that action from the user is required and after this action date of the event is set.

11.4.3 Impact Analysis result presentation on OPENCOSS server reports

IA-induced user actions that need to be performed in the assurance project are presented on **Compliance Estimation Report** and **Compliance Report**.

These reports are described in Compliance Estimation report and Compliance report in general.

Hereafter is a description of **Impact Analysis** results being presented on these reports.



Compliance report

Project Compliance

Overall compliance status: -

Type	Baseline Element Name	Compliance Status	IA Status
	2-5.5.1 Organization-specific rules and processes for functional safety	Not compliant	2
	2-5.5.2 Evidence of competence	-	-
	2-5.5.3 Evidence of quality management	-	-
	2-5.3.2.1 Evidences of a quality management system	-	-
	2-6.3.2.1 Project Plan	-	-
	2-6.3.2.2 Other safety activities	-	-
	2-6.5.1 Safety Plan	-	-
	2-6.5.2 Project Plan (refined)	-	-
	2-7.5.1 Evidence of field monitoring	-	-
	4-5.5.3 Item integration and testing plan	-	-
	4-6.5.1 Technical safety requirements specification	-	-
	4-7.3.2.1 Preliminary architectural assumptions	-	-
	4-7.3.2.2 Functional concept	-	-
	4-7.3.2.3 Functional safety concept	-	-
	1. Vocabulary	-	-

Base Asset Compliance Details

Selected Baseline Element Name: **2-5.5.1 Organization-specific rules and processes for functional safety**
Compliance Status: **The selected requirement contains evidence which is not compliant with it**

Add a compliance evidence to this project baseline element.

Please **drag and drop** a file to this area or press Upload

Note: Pressing [Assign] button will commit your file to SVN and assign it as a compliance evidence.

Details: [Expand to Justification] [Expand to Asset] [Expand to Resource]

⊟ Compliance Justification: *Artefact test*	Fully	⊖
⊟ Artefact: *Artefact1 - DevloaderTomcat7.jar*	To modify	Modified
Resource: *DevloaderTomcat7.jar* [Download]		
⊟ Compliance Justification: *Just*	Fully	⊖
⊟ Artefact: *Artefact2 - devloaderWorkspace mod*		
Resource: *devloaderWorkspaces* [Download]		
⊟ Compliance Justification: *nope*	No map	⊖
⊟ Artefact: *icon.xpm*	To validate	Validated
Resource: *icon.xpm* [Download]		

Figure 235 - Web interface showing two IA-induced actions required to be taken by user

In "**Project Compliance**" table on the left panel, "**IA Status**" column presents the status of the specific baseline element from **Impact Analysis** point of view. The following information is presented:

- Grey color means that there is no artefact compliant to this baseline element thus there is no entity on which AI can work.
- Red color means that some of the artefacts compliant with this baseline element where affected by AI and they require attention from the user. The displayed number represents the amount of such affected artefacts.
- Green color means that there is no action required by IA from user after IA traversed the associated artefacts.

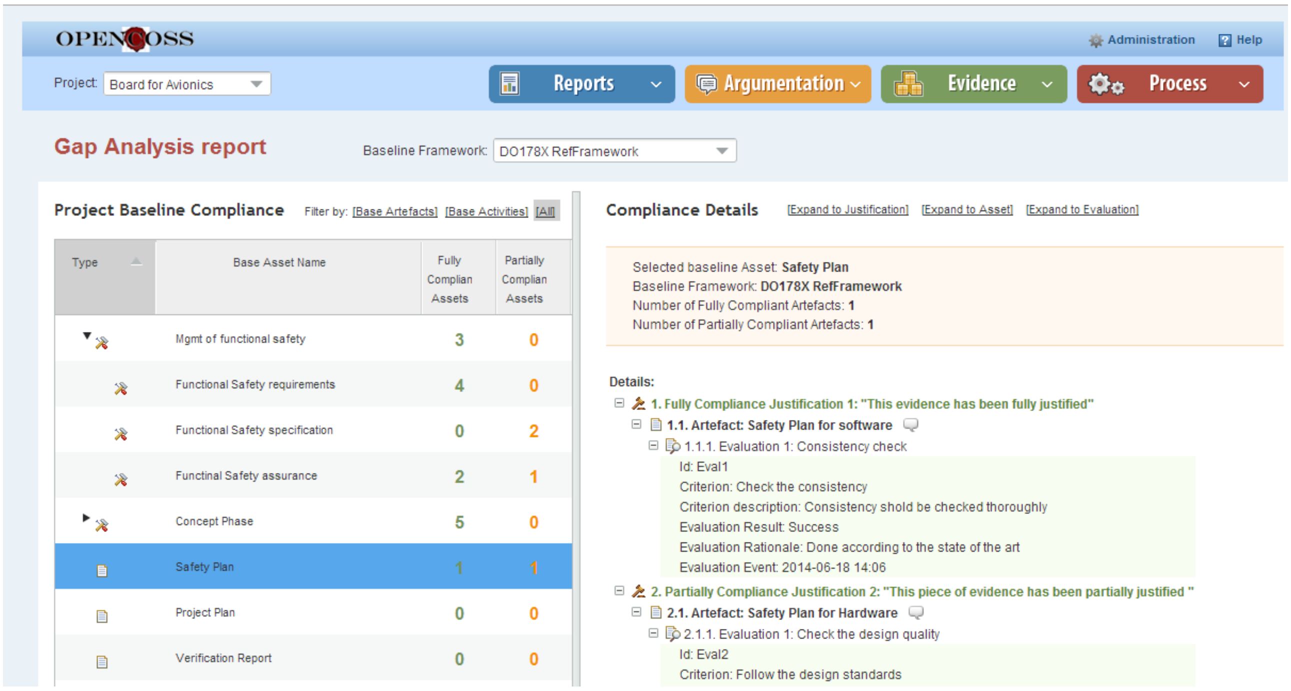
On "**Base Asset Compliance Details**" panel the compliant artefacts and their details are presented.
The information also includes **IA results** in case when AI algorithm detected that some action need to be performed by a user.
As it regards the above screenshot, IA execution resulted in detection of two actions required by the user: "**To validate**" and "**To modify**". This information is presented next to the respective artefacts.
When the user takes the according measures (i.e. validates or modifies the respective artefacts) he can simply clicks "**Modified**" and "**Validated**" action buttons to report that the requested activity has been performed.

11.5 Gap Analysis report - Compliance Assessment and Evidence Evaluation

Gap Analysis report facilitates the following pieces of functionality:

- Compliance Assessment by viewing a Gap Analysis
- Viewing Evidence Evaluation results

In order to view Gap Analysis report, please go to OPENCOSS platform web server page in your web browser at http://<OPENCOSS-SERVER-HOST-NAME>:8080/. and select Reports > Gab Analysis report from menu.



Project: Board for Avionics

Gap Analysis report

Baseline Framework: DO178X RefFramework

Project Baseline Compliance

Filter by: [Base Artefacts] [Base Activities] [All]

Type	Base Asset Name	Fully Complian Assets	Partially Complian Assets
▾	Mgmt of functional safety	3	0
	Functional Safety requirements	4	0
	Functional Safety specification	0	2
	Functinal Safety assurance	2	1
▸	Concept Phase	5	0
	Safety Plan	1	1
	Project Plan	0	0
	Verification Report	0	0

Compliance Details [Expand to Justification] [Expand to Asset] [Expand to Evaluation]

Selected baseline Asset: **Safety Plan**
Baseline Framework: **DO178X RefFramework**
Number of Fully Compliant Artefacts: **1**
Number of Partially Compliant Artefacts: **1**

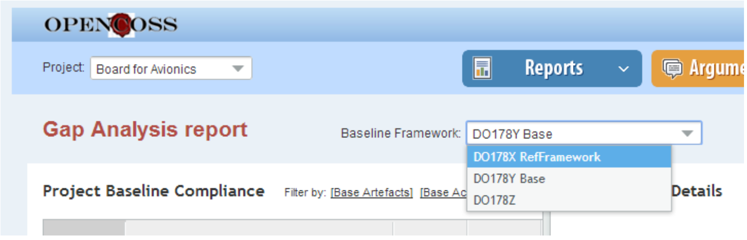
Details:

- 1. Fully Compliance Justification 1: "This evidence has been fully justified"
  - 1.1. Artefact: Safety Plan for software
    - 1.1.1. Evaluation 1: Consistency check
      Id: Eval1
      Criterion: Check the consistency
      Criterion description: Consistency shold be checked thoroughly
      Evaluation Result: Success
      Evaluation Rationale: Done according to the state of the art
      Evaluation Event: 2014-06-18 14:06
- 2. Partially Compliance Justification 2: "This piece of evidence has been partially justified "
  - 2.1. Artefact: Safety Plan for Hardware
    - 2.1.1. Evaluation 1: Check the design quality
      Id: Eval2
      Criterion: Follow the design standards

Figure 236 - Gap Analysis report

11.5.1 Gap Analysis report core functionality

Gap Analysis report presents summary and details regarding specific assurance project base artefacts and base activities and their compliance mapping to the actual evidence and activities.
For the selected assurance project its baseline frameworks are presented in a select box.



Project: Board for Avionics

Gap Analysis report

Baseline Framework: DO178Y Base
DO178X RefFramework
DO178Y Base
DO178Z

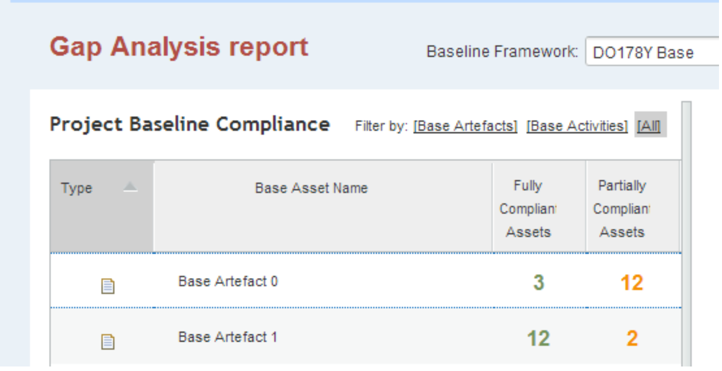
Project Baseline Compliance Filter by: [Base Artefacts] [Base Ac

Details

Figure 237 - Baseline frameworks for the specific assurance project

After choosing the specific baseline framework, the following gap analysis data is presented:

- In a left pane, called “Project Baseline Compliance”, base artefacts and base activities of the selected project baseline framework are shown. They are displayed in a tree structure to express parent-child hierarchy of these items. For each base artefact or base activity the total numbers of fully- and partially- compliant assets are presented.
  The “Project Baseline Compliance” table can be filtered to show only base artefacts or base activities and can be sorted by any column.



Gap Analysis report

Baseline Framework: DO178Y Base

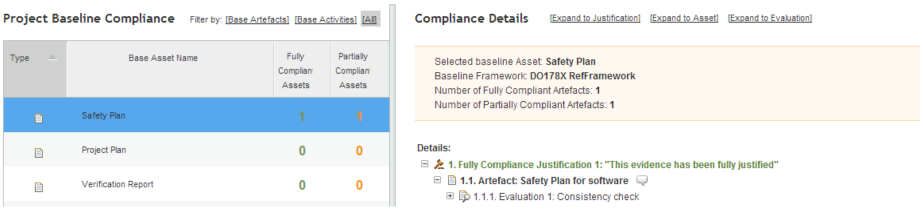
Project Baseline Compliance

Filter by: [Base Artefacts] [Base Activities] [All]

Type	Base Asset Name	Fully Complian Assets	Partially Complian Assets
	Base Artefact 0	3	12
	Base Artefact 1	12	2

Figure 238 - Project baseline compliance table

- When user selects the specific cell in the left pane table (e.g. specific base artefact or the number of fully- or partially-compliant assets), the right panel is refreshed with the details regarding the selected item.
- For specific base artefact or base activity selected in the left panel, the right details panel presents the following information:
  - Summary of the specific base artefact or base activity compliance mapping
  - For the given base artefact and base activity: Compliance Justification elements from its compliance mapping
  - For each Compliance Justification: the actual assets i.e. artefacts or activities
  - For each artefact or activity: its description and properties are presented on the tooltip
  - For each artefact or activity: its evaluation is shown - in case the asset has been evaluated.



Project Baseline Compliance

Filter by: [Base Artefacts] [Base Activities] [All]

Type	Base Asset Name	Fully Complian Assets	Partially Complian Assets
	Safety Plan	1	1
	Project Plan	0	0
	Verification Report	0	0

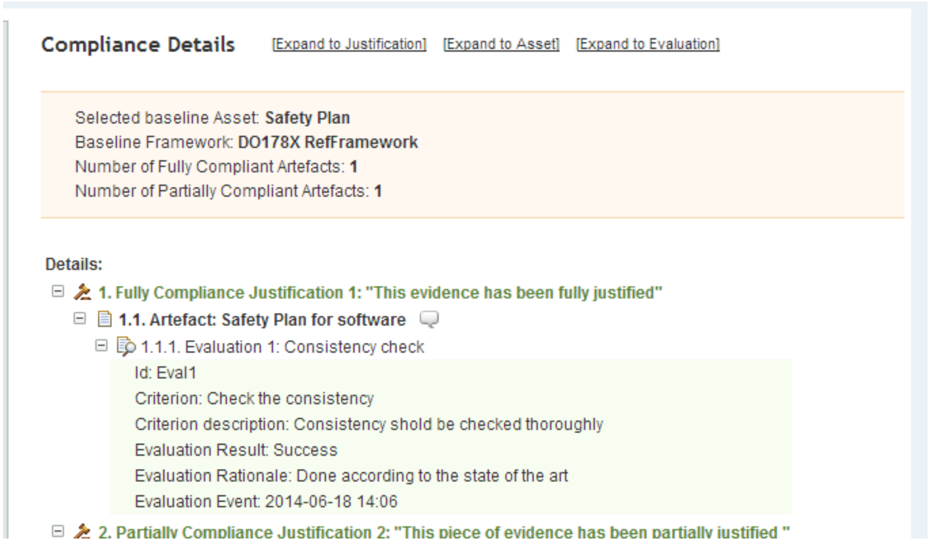
Compliance Details [Expand to Justification] [Expand to Asset] [Expand to Evaluation]

Selected baseline Asset: **Safety Plan**
Baseline Framework: **DO178X RefFramework**
Number of Fully Compliant Artefacts: **1**
Number of Partially Compliant Artefacts: **1**

Details:
⊟ **1. Fully Compliance Justification 1: "This evidence has been fully justified"**
⊟ **1.1. Artefact: Safety Plan for software**
⊞ 1.1.1. Evaluation 1: Consistency check

Figure 239 - Compliance details for the selected baseline element

The “Compliance Details” tree can be expanded to the specific level by pressing links at the top of the panel.



Compliance Details [Expand to Justification] [Expand to Asset] [Expand to Evaluation]

Selected baseline Asset: **Safety Plan**
Baseline Framework: **DO178X RefFramework**
Number of Fully Compliant Artefacts: **1**
Number of Partially Compliant Artefacts: **1**

Details:

- **1. Fully Compliance Justification 1: "This evidence has been fully justified"**
  - **1.1. Artefact: Safety Plan for software**
    - 1.1.1. Evaluation 1: Consistency check
      Id: Eval1
      Criterion: Check the consistency
      Criterion description: Consistency shold be checked thoroughly
      Evaluation Result: Success
      Evaluation Rationale: Done according to the state of the art
      Evaluation Event: 2014-06-18 14:06
- **2. Partially Compliance Justification 2: "This piece of evidence has been partially justified "**

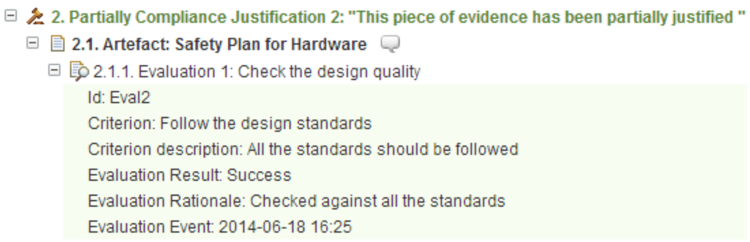
Figure 240 - Compliance details

For example, if user is interested only in justification or assets or their evaluation, he can *press [Expand to Justification]*, *[Expand To Asset]* or *[Expand to Evaluation]* links respectively. The details tree is expanded accordingly.

11.5.2 Viewing Evidence Evaluation in Gap Analysis report

In case a specific evidence item has been evaluated in OPENCOSS client tool, its evaluation data are shown on the Gap Analysis report.

All the evaluation properties (Id, Criterion, Evaluation result, etc.), and the evaluation date and time are presented.



- **2. Partially Compliance Justification 2: "This piece of evidence has been partially justified "**
  - **2.1. Artefact: Safety Plan for Hardware**
    - 2.1.1. Evaluation 1: Check the design quality
      Id: Eval2
      Criterion: Follow the design standards
      Criterion description: All the standards should be followed
      Evaluation Result: Success
      Evaluation Rationale: Checked against all the standards
      Evaluation Event: 2014-06-18 16:25

Figure 241 - Evidence evaluation details

11.6 Metrics reports

This chapter presents the implemented metric reports, their functionality and layout.

11.6.1 Metrics Estimation Report

The Metrics Estimation Report can be accessed via the following OPENCOSS web server menu item:

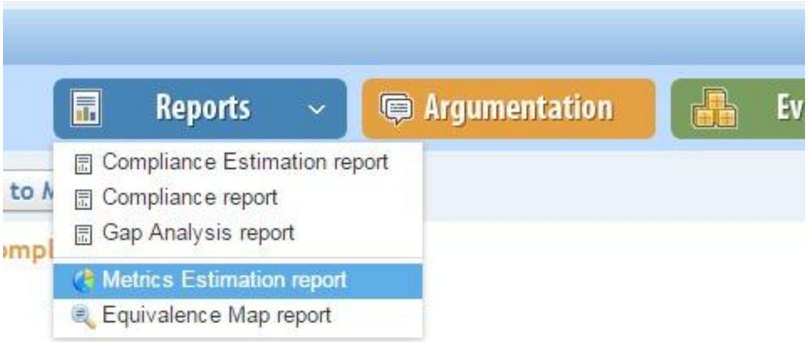


Figure 242 - Menu item directing to "Metrics Estimation report"

When a specific OPENCOSS safety project is selected in the top panel, its defined baselines are presented in the middle panel select box, as shown in Figure 211.
The report data is divided into two panels. The first one, on the left, is a static menu panel in which the user can select a type of metrics to analyse.

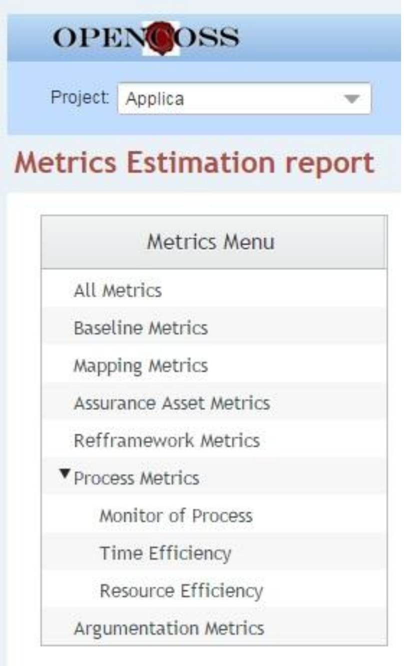
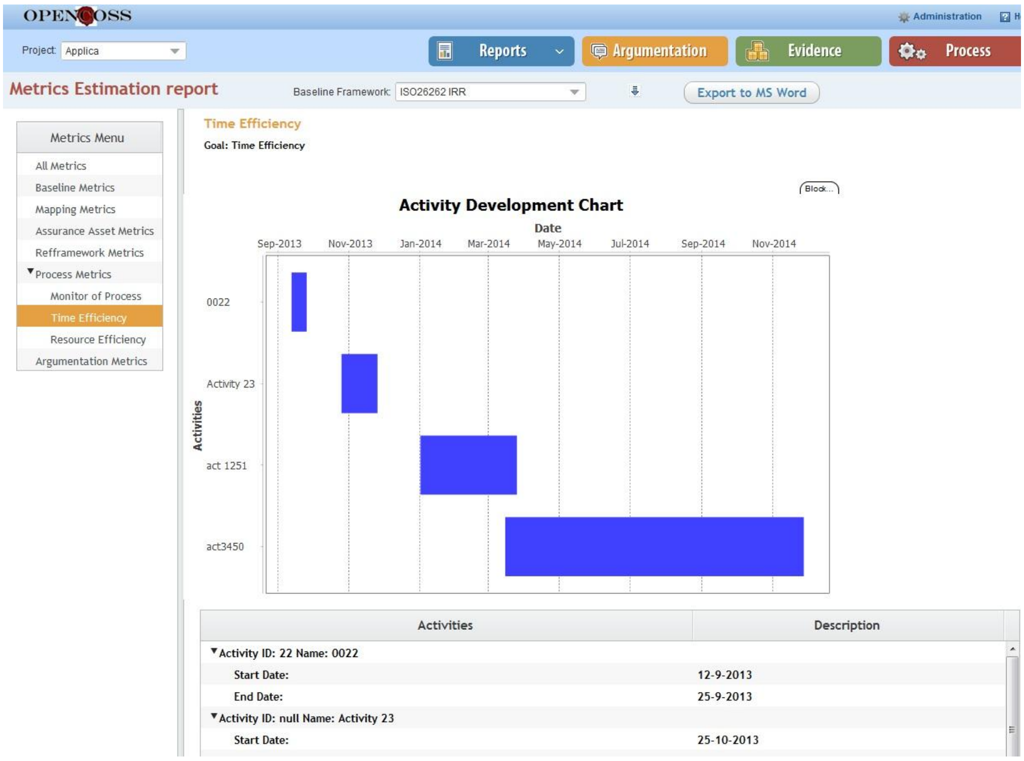


Figure 243 - Metrics Menu in the top-left portion of the report

Once a specific metrics is selected on the Metrics menu, the metrics menu details are presented in the right part of the report with a description of the main goal and all the different types of charts related to that metric.
Also, the user has the option to the selected metric to a Word Document with more detailed information.
As a small example, the following figure:



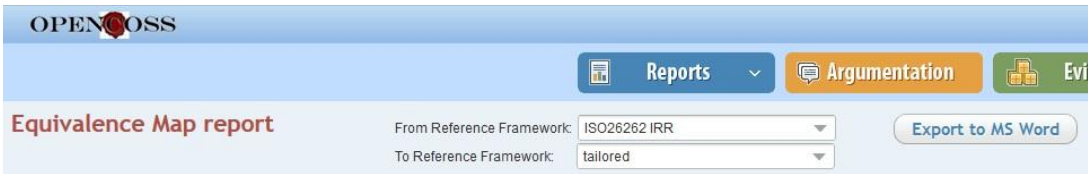
Activities	Description
▾Activity ID: 22 Name: 0022	
Start Date:	12-9-2013
End Date:	25-9-2013
▾Activity ID: null Name: Activity 23	
Start Date:	25-10-2013

Figure 244 - Description of the selected metric type presented at the left

11.6.2 Equivalence Map Report

The Equivalence Map Report can be accessed via the following OPENCOSS web server menu item as showed beforehand.

In this case the equivalence metrics are between two Reference frameworks, not specific OPENCOSS safety project needs to be selected in the top panel. The only possible configurations are between reference frameworks as shown in figure below



From Reference Framework: ISO26262 IRR

To Reference Framework: tailored

Figure 245 - Selection of reference frameworks

After the selection, the metrics of the equivalence maps and a detailed description are showed on the screen. There is also a possibility to export this information to a document.

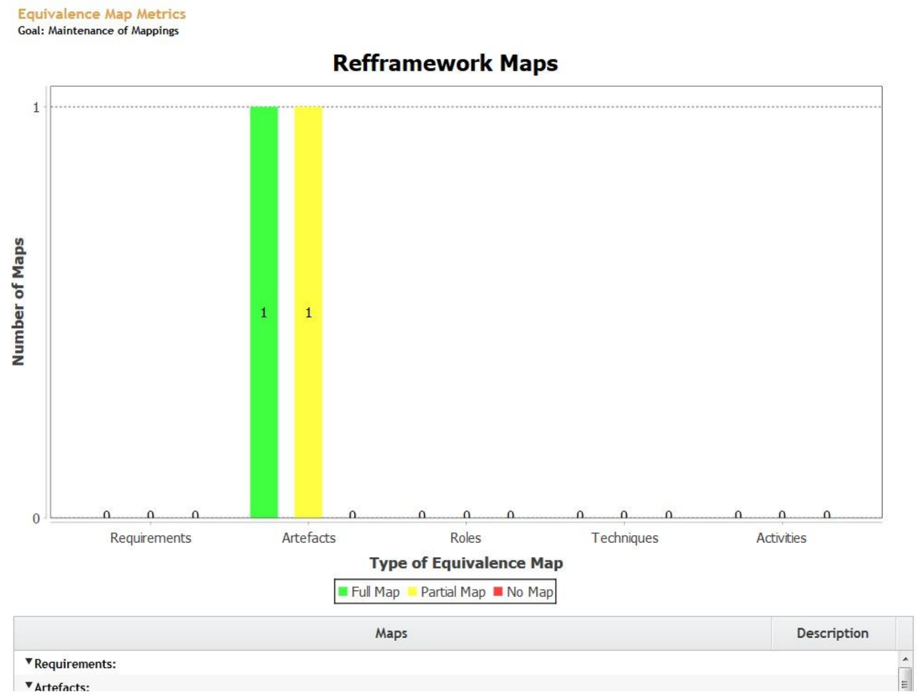


Figure 246 - Equivalence Map Report

11.7 Administration web GUI

OPENCOSS server web pages provide a few basic pages for server administration.
They are accessible through “Administration” menu.

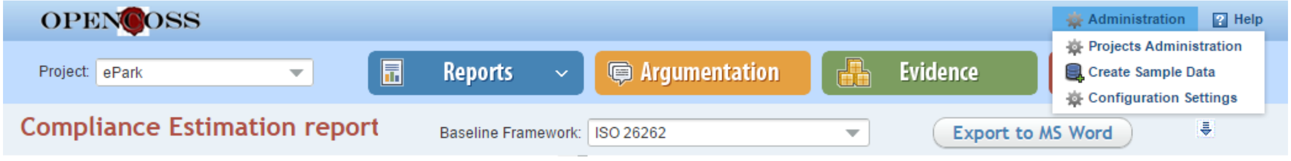
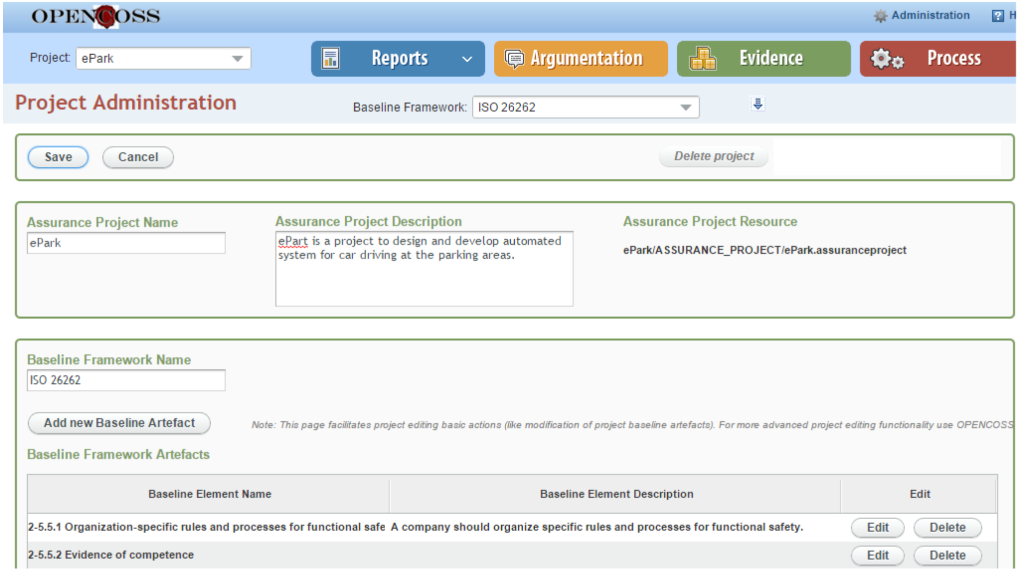


Figure 247 - Administration menu

11.7.1 Projects Administration

This administration page facilitates project editing basic actions.
For more advanced project editing functionality, OPENCOSS Eclipse Client Editor should be used.
The page allows the following basic actions:

- Project name and description editing.
- Project baseline name editing.
  Note that only one baseline of the project is presented.
- Project baseline element editing.
  User can add, remove and modify baseline elements.
  For the specific baseline element, its name and description can be specified.



Project Administration

Baseline Framework: ISO 26262

Assurance Project Name: ePark

Assurance Project Description: ePart is a project to design and develop automated system for car driving at the parking areas.

Assurance Project Resource: ePark/ASSURANCE_PROJECT/ePark.assuranceproject

Baseline Framework Name: ISO 26262

Note: This page facilitates project editing basic actions (like modification of project baseline artefacts). For more advanced project editing functionality use OPENCOSS

Baseline Framework Artefacts

Baseline Element Name	Baseline Element Description	Edit
2-5.5.1 Organization-specific rules and processes for functional safe	A company should organize specific rules and processes for functional safety.	Edit Delete
2-5.5.2 Evidence of competence		Edit Delete

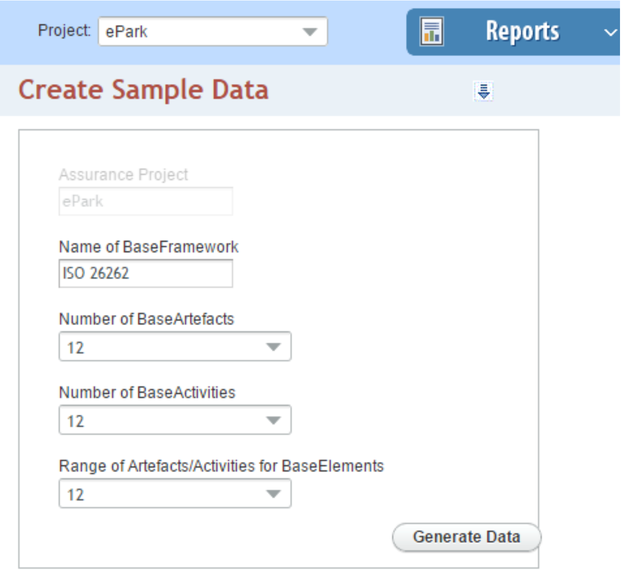
Figure 248 - Project Admininstration web page on OPENCOSS server

11.7.2 Create Sample Data

This OPENCOSS server administration web page provides a functionality, which allows user to generate sample data in the database.
The sample data can be generated for example in order to demonstrate Gap Analysis report.

OPENCOSS user can generate the following sample data for the selected assurance project:

- baseline framework
- base artefacts
- base activities
- artefacts and activities being mapped with compliance mapping to the base artefacts and base activities.



Create Sample Data

Assurance Project: ePark

Name of BaseFramework: ISO 26262

Number of BaseArtefacts: 12

Number of BaseActivities: 12

Range of Artefacts/Activities for BaseElements: 12

Figure 249 - Create sample data page

After pressing [**Generate Data**], sample data will be created and inserted into the selected assurance project.

11.7.3 Configuration Settings

This page presents the main configuration settings of the OPENCOSS server.
These settings are stored and can be modified on OPENCOSS server host, in *opencoss-properties.xml* file which is present in the operating system user home directory.